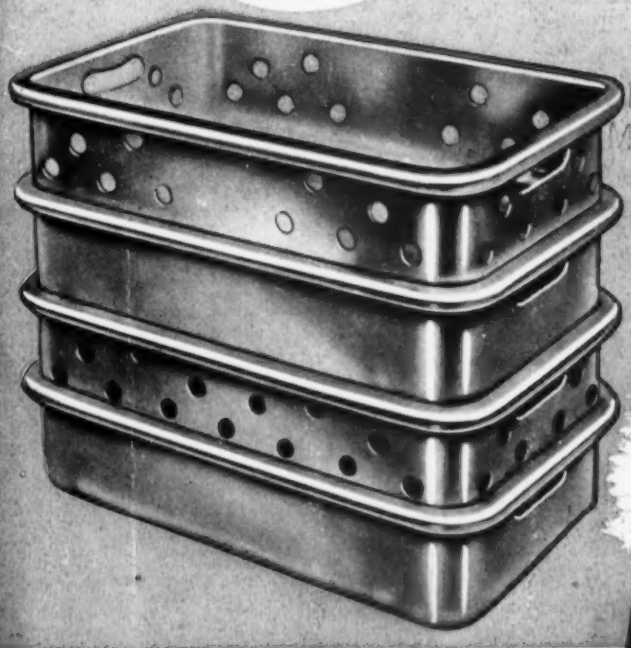
FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP OCTOBER 1, 1958

HYGIENE puts YOU on OUR metal!

ALUMINIUM Stacking Container



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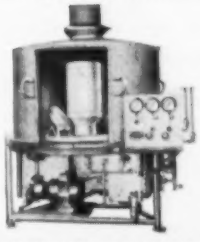

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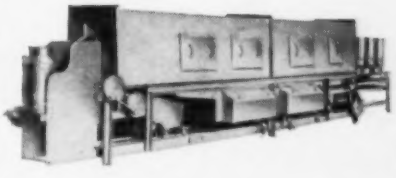

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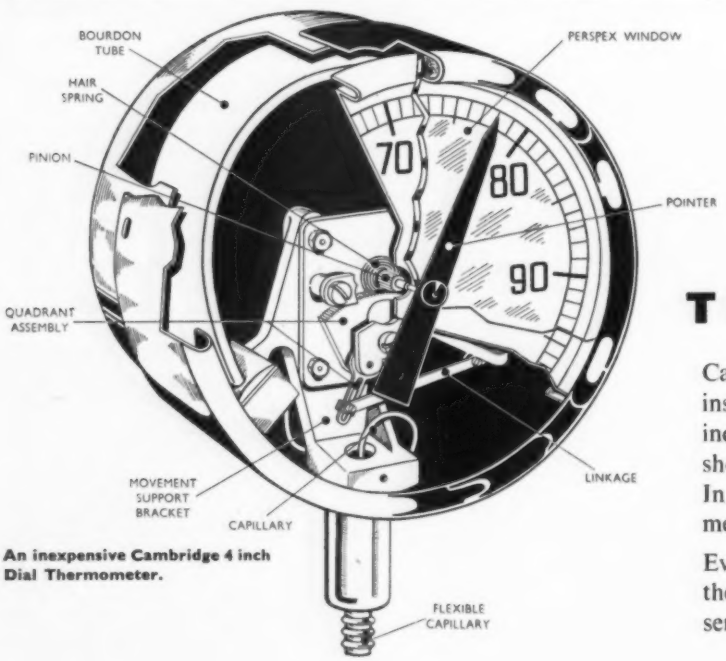

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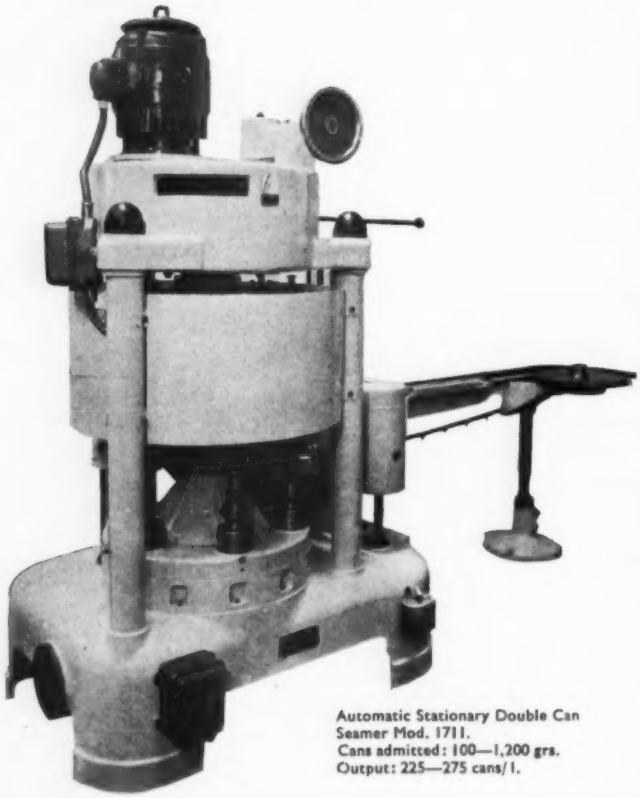

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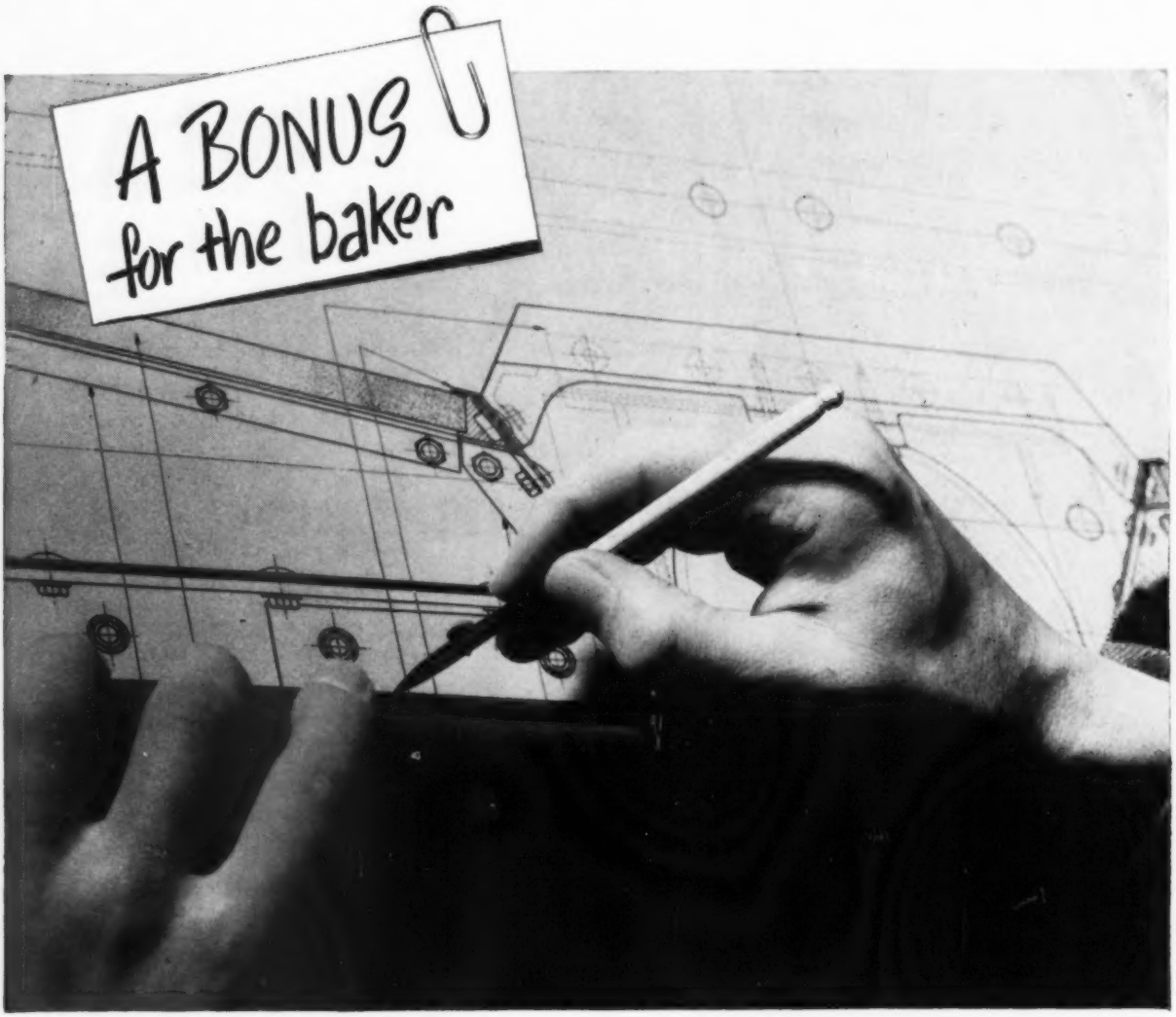

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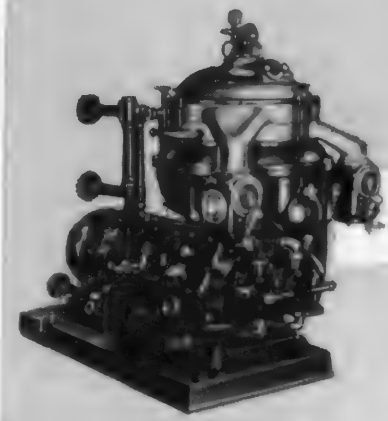

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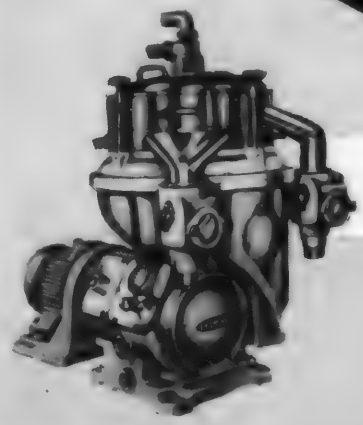
Caustic liquors	*	Coffee extract
Colour dye liquors	*	Napthalene oil
Rough beer	*	Viscose etc.

SEPARATION and **PURIFICATION** of

Animal fats	*	Butter
Crude vegetable oils	*	Herring oil
Glue water	*	Lime juice



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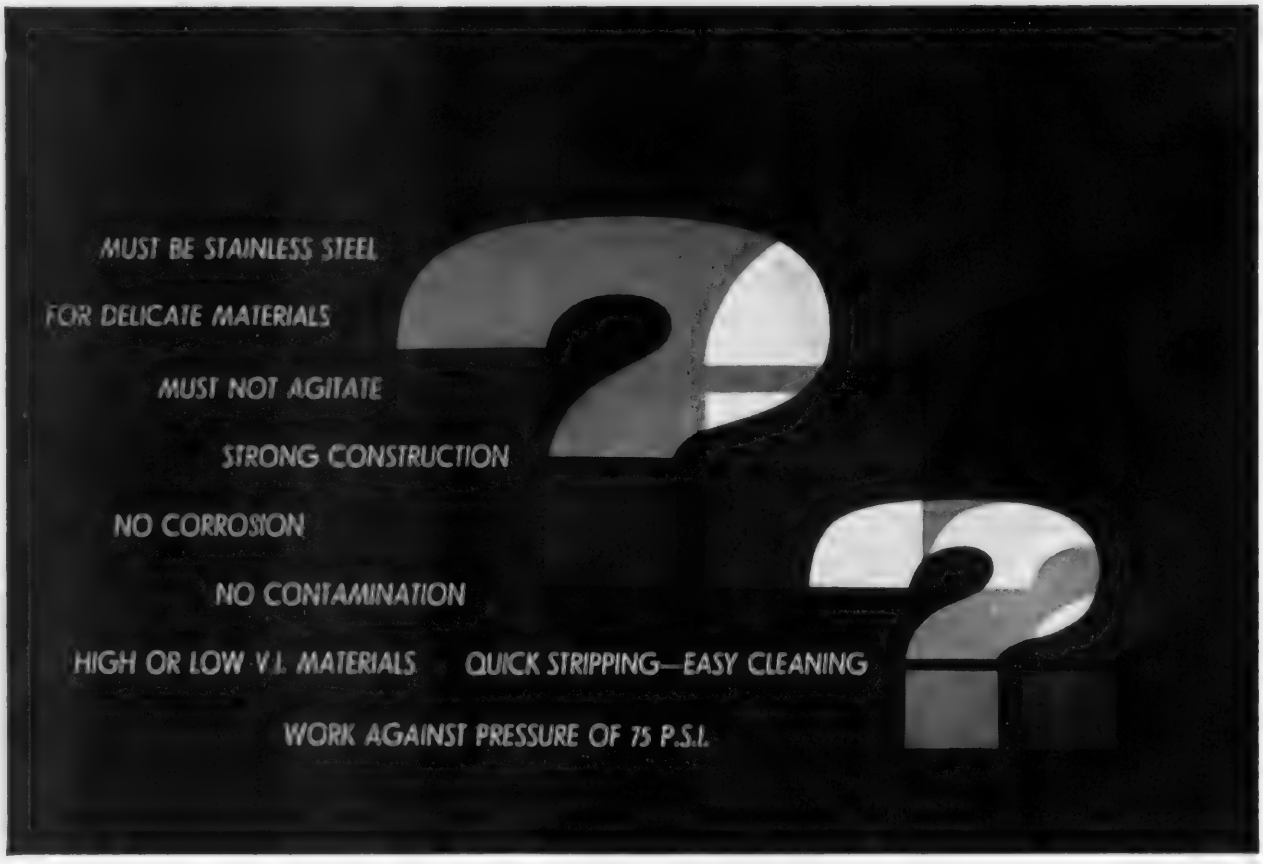

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THE HOWARD 'M' TYPE All Stainless Steel Positive Rotary Pump is a robustly constructed piece of machinery especially designed to solve difficult pumping problems. It handles delicate materials—even those with a high V.I.—without any agitation or contamination. The pump can, when necessary, be jacketed for heating, or cooling.

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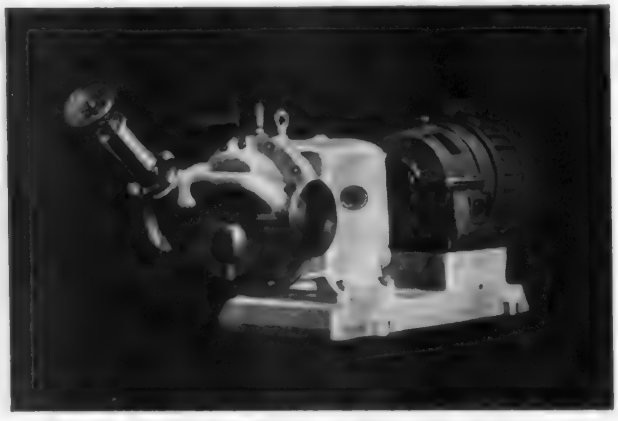

V.I. VERSATILITY: The 'M' Type will handle high or low V.I. materials with equal ease and efficiency. For high V.I. materials the specially designed rotors and the large suction and discharge passages assure an easy, streamlined flow.

EASY MAINTENANCE: Cleaning the 'M' Type is a quick and easy process. For cleaning, the Rotor Case and Rotors are removed from the body of the pump. Stripping and reassembly are made much easier by the use of special type wing nuts which hold complete Rotor Case and Pumping Head in position.

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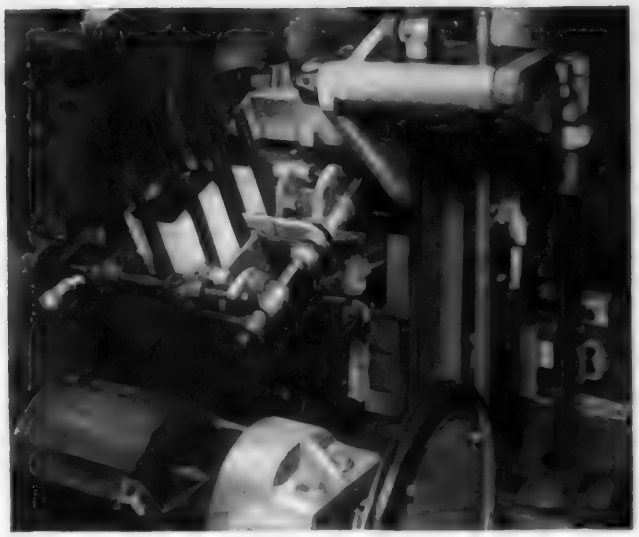
Other types of labelling machine from Bench labellers to machines that will apply labels both back and front.



This "UNIMATIC" at one of the Crosse & Blackwell Factories is applying both body and neck label simultaneously, to the famous "BRANSTON SAUCE" bottle. The double label magazine and "gripfingers" holding label to bottle, can be clearly seen.

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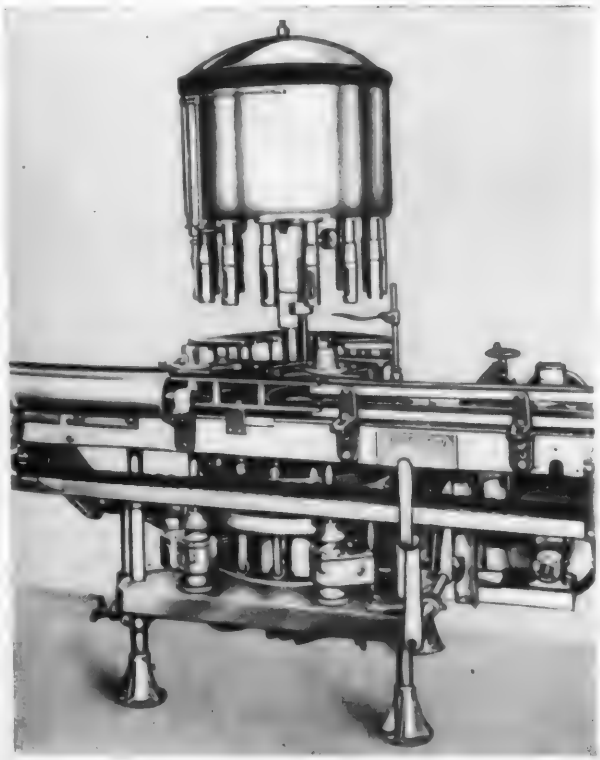

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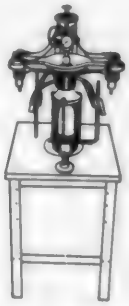

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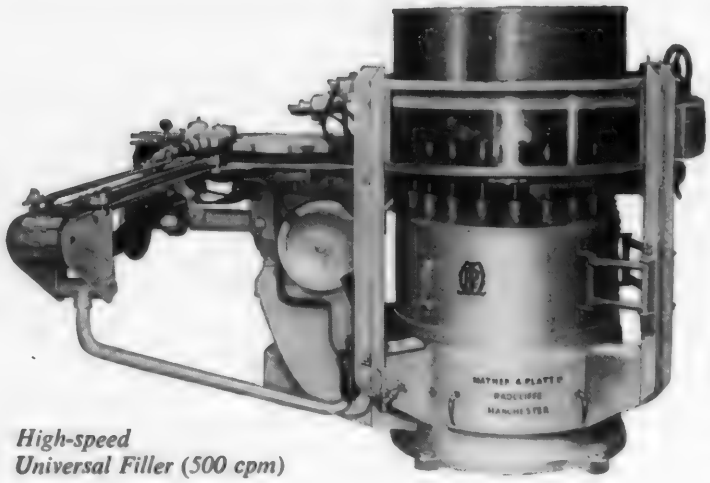
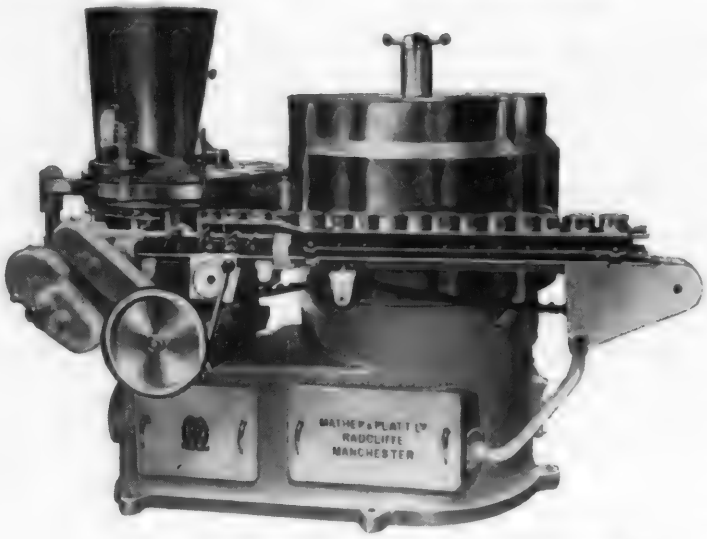


High-speed Universal Filler (500 cpm)



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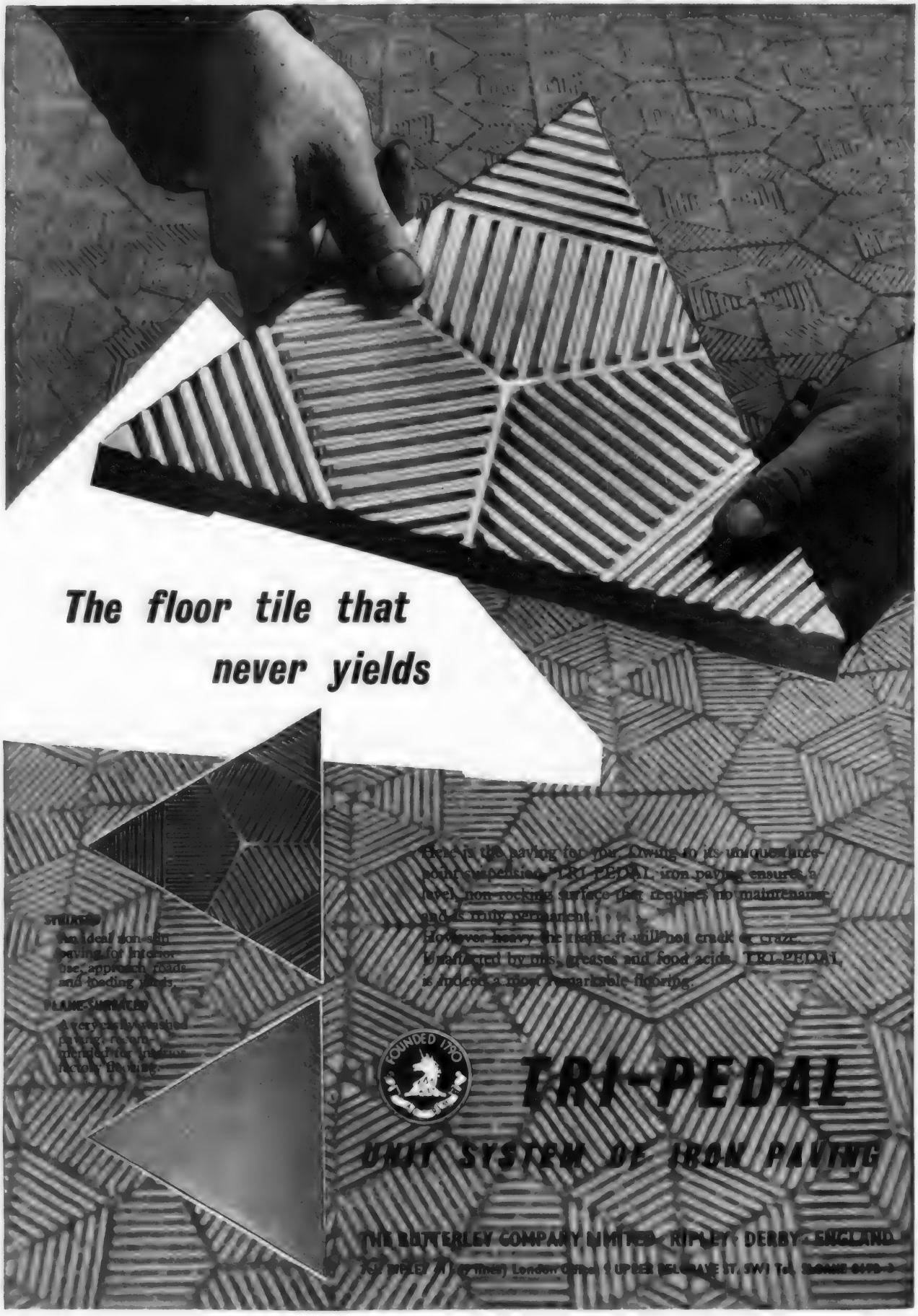
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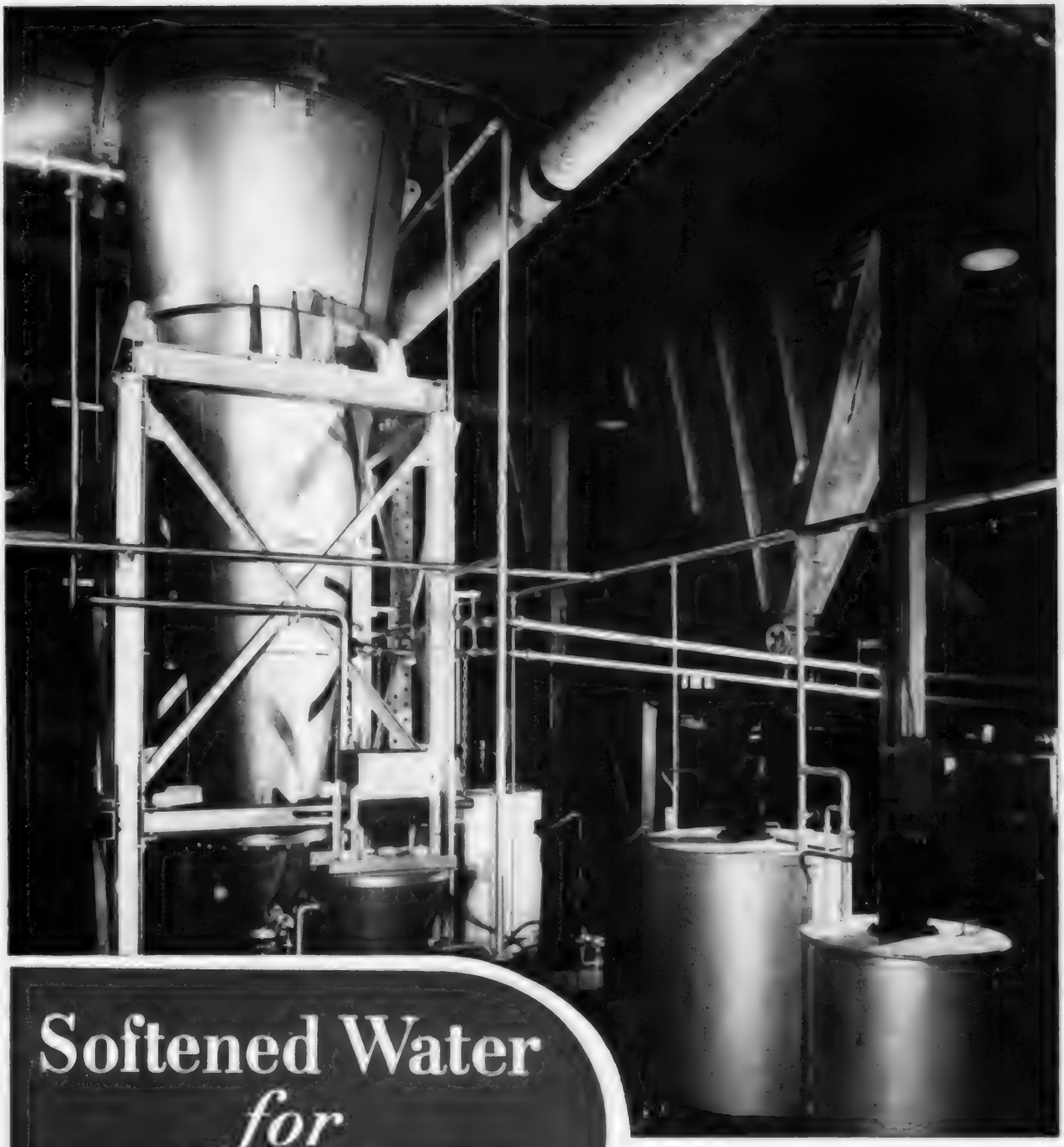

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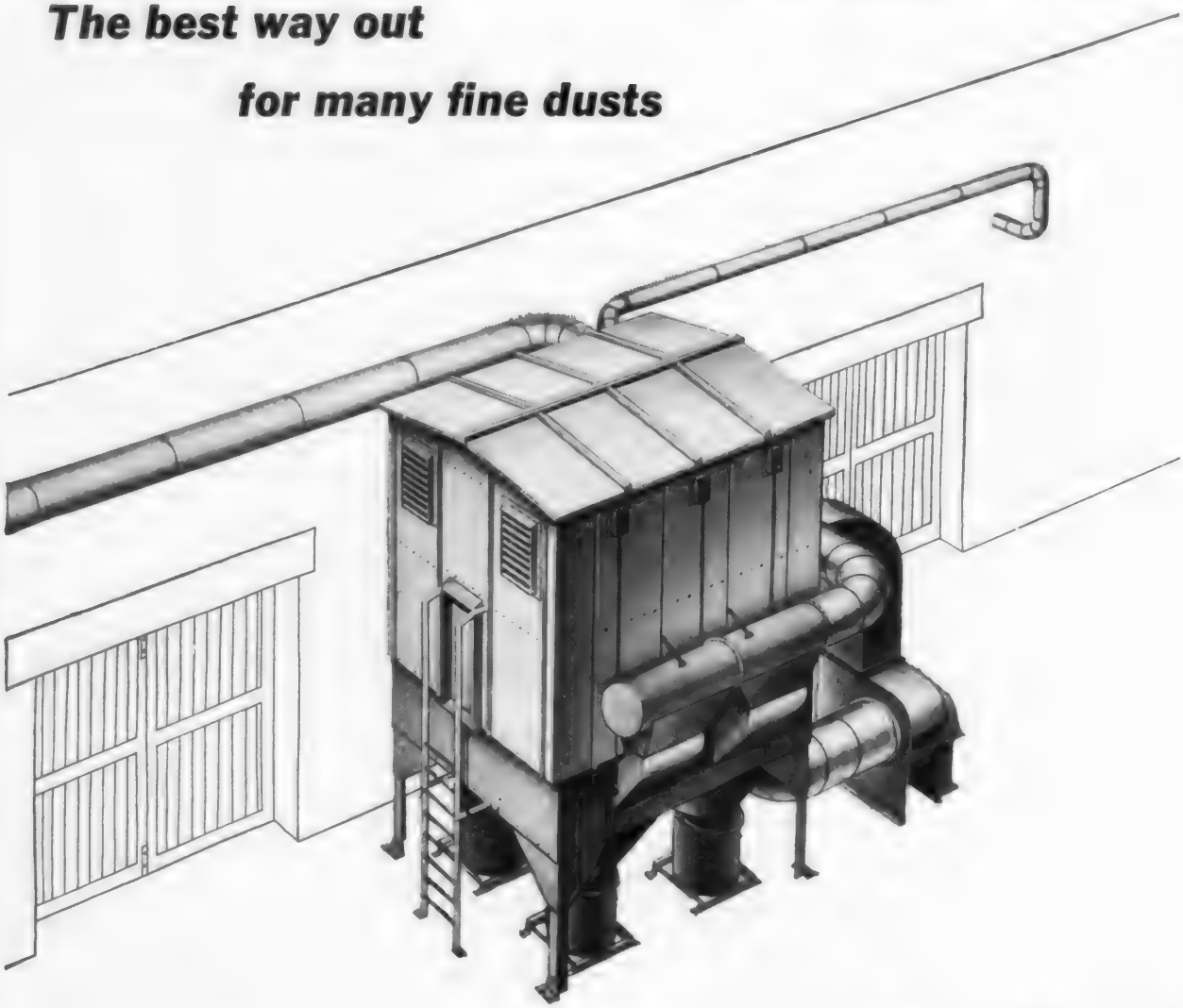

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DUST CONTROL EQUIPMENT FOR INDUSTRY

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MEET CBC No 8

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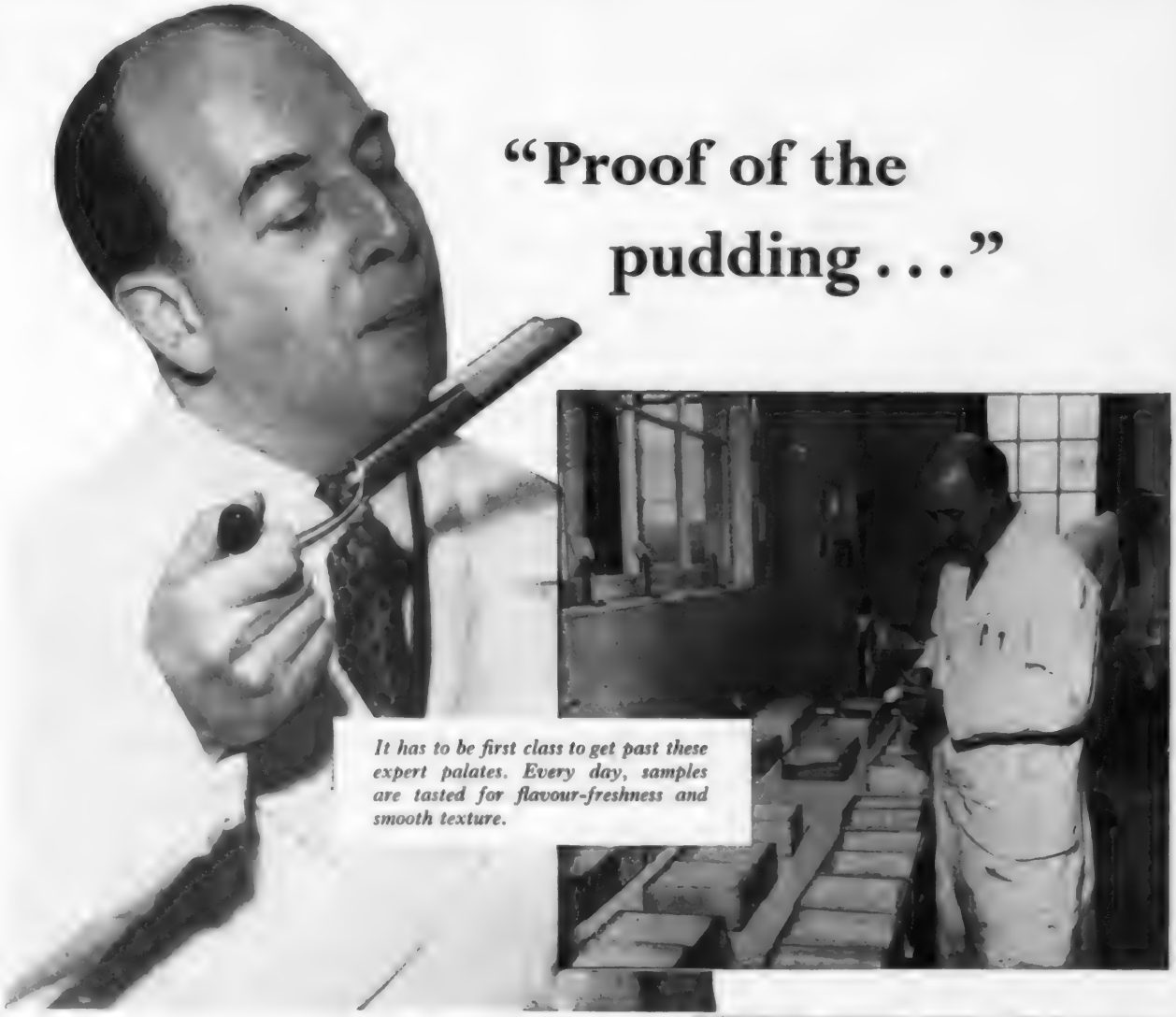

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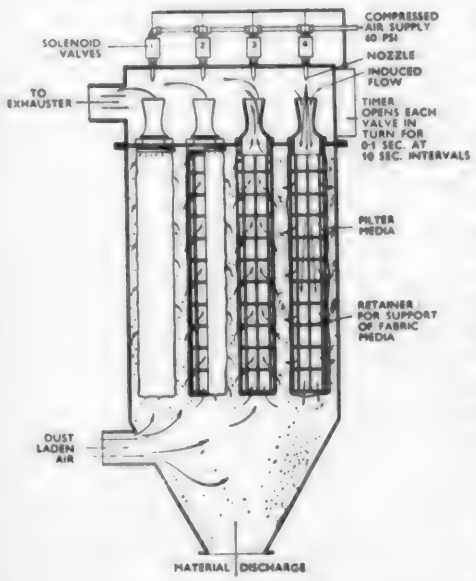
Mikro-D News!

Continuous automatic filter cleaning with no moving parts

The MIKRO-PULSAIRE DUST COLLECTOR embodies an entirely new system in the separation of dusts and powders.



The dust laden air is fed into the cabinet by suction or pressure. The air passes through the filter media leaving the solid material on the outside of the cylinders which are cleaned periodically and automatically by a high velocity air current operating in the reverse direction to the main flow.

High efficiency (99·9%), low power requirements, less space, and virtually no maintenance are a few of the proven advantages of this new, simple, non-mechanical system of dust collection. Filtration is at a uniform rate and very high dust loading can be dealt with without the need of other equipment such as cyclones etc.

Because of its simple design without internal moving parts The Pulsaire Collectors can be sold at very competitive prices.

Please write for Bulletin 52A which describes the Pulsaire in details.

The Mikro-D Pulsaire is marketed only by

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Chopped Mushrooms	1,488gms.
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Hardened Palm Kernel Oil	252gms.
Soyolk "A" (Soya Flour)	150gms.
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Margarine	102gms.
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Bulk to 6,868mls. with water

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The chopped mushrooms are pressure cooked in sealed containers for ten minutes at 240°F. (10lb. pressure per square inch). The rest of the ingredients are mixed to a smooth paste with the reconstituted milk powder and bulked to 6,868mls. with water and the strained mushroom liquor. The soup is brought to the boil and allowed to simmer for ten minutes and homogenised. The mushrooms are then added and the soup reheated to 200°F before filling the cans. No. 1 Tall cans should be processed for one hour at 240°F and water cooled.

Remember that the Fredk. Boehm Experimental Kitchen exists to help you. Perhaps you have a recipe of your own which is proving to be a problem; or perhaps you want a recipe prepared for you by experts. That is where our unrivalled experience can help you. Write to us at the address below. The service, by the way, is FREE.

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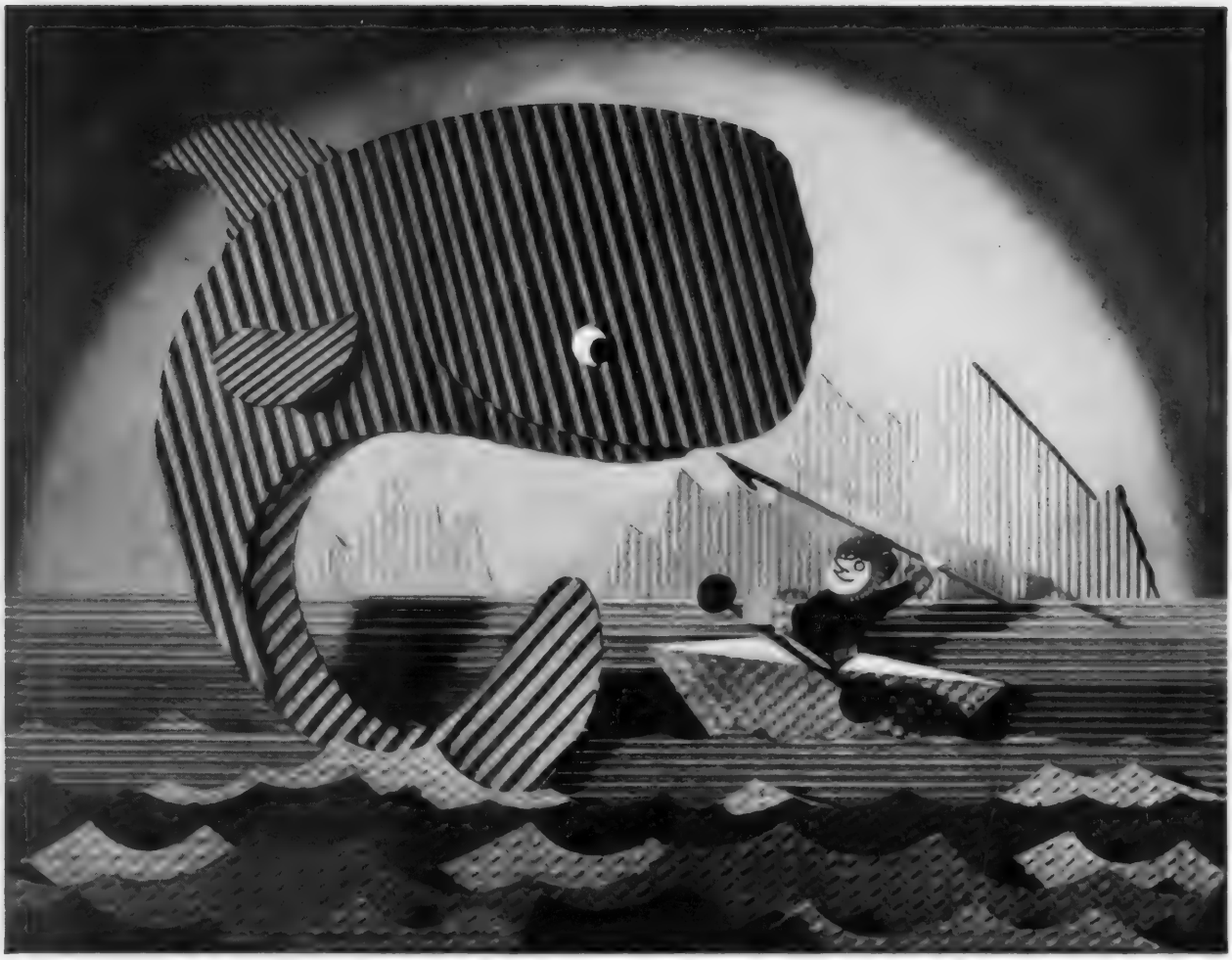

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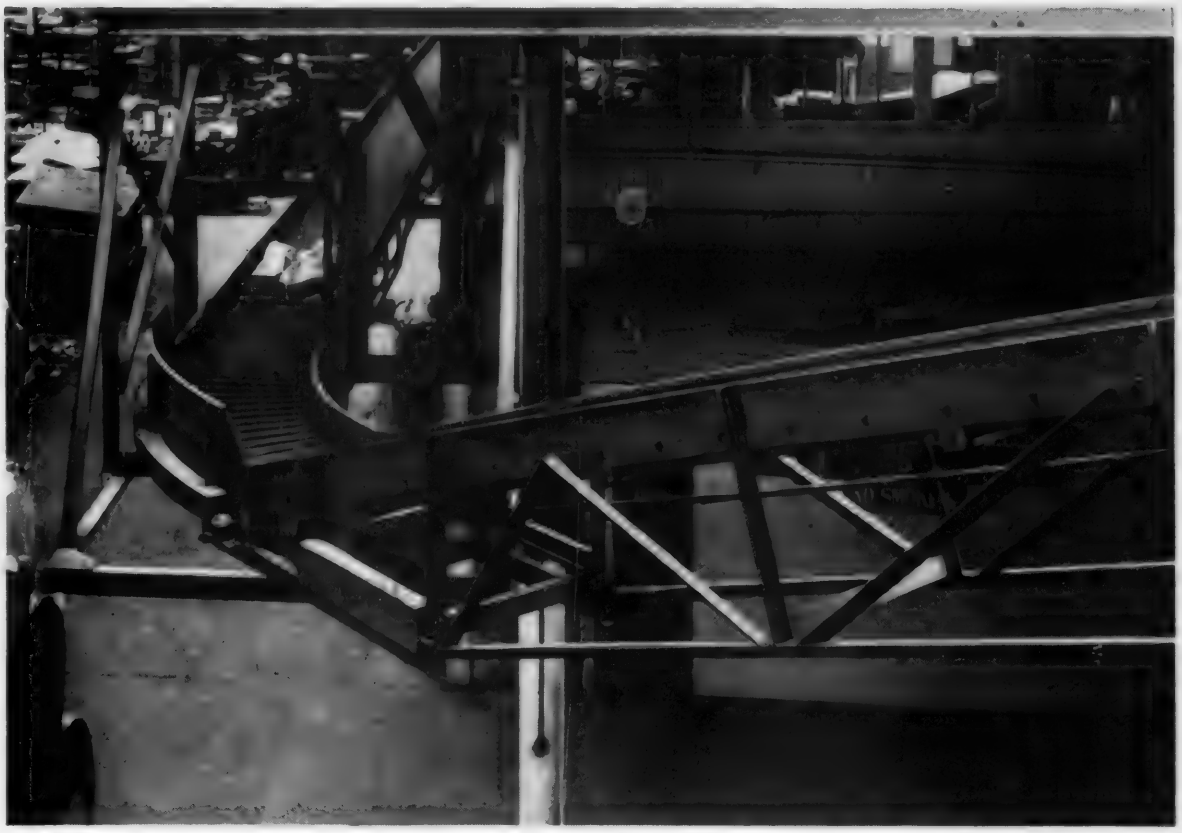

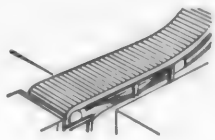

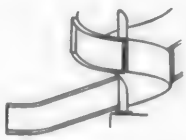

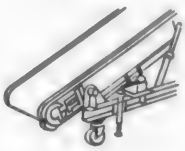

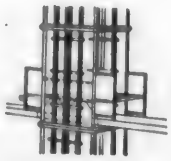

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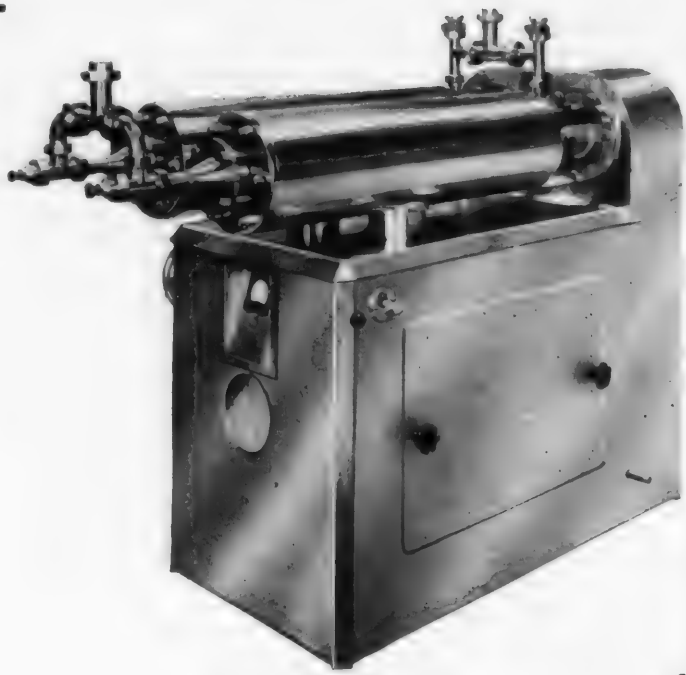

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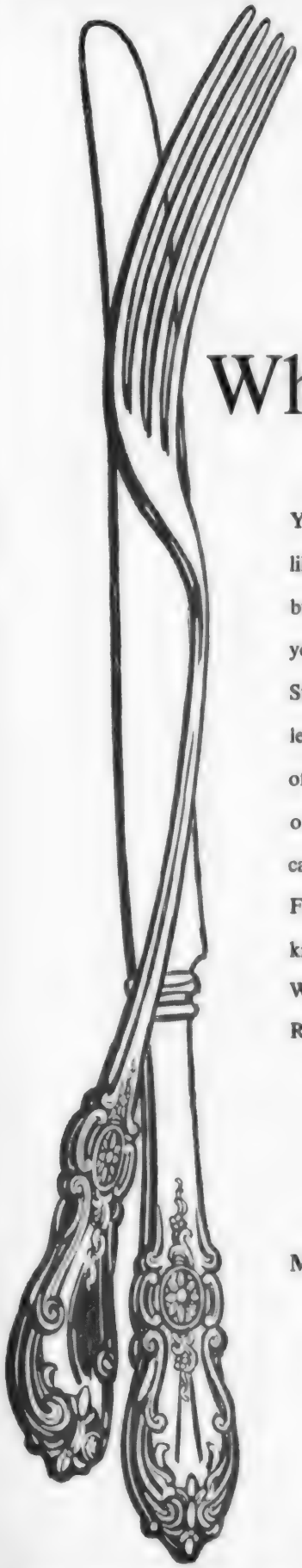
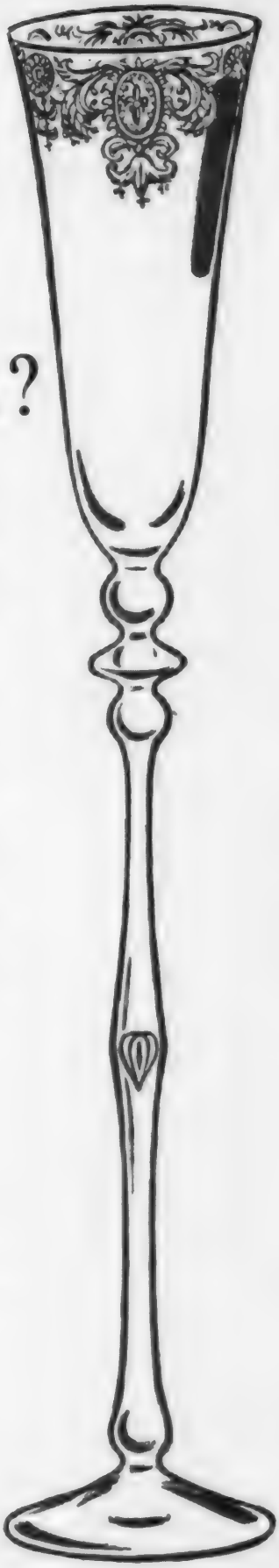


Who is a gourmet?



Your customers are. They enjoy good flavours. They like the taste of your products, that is why they keep on buying them. It is most important to them and you that your flavours remain the same.

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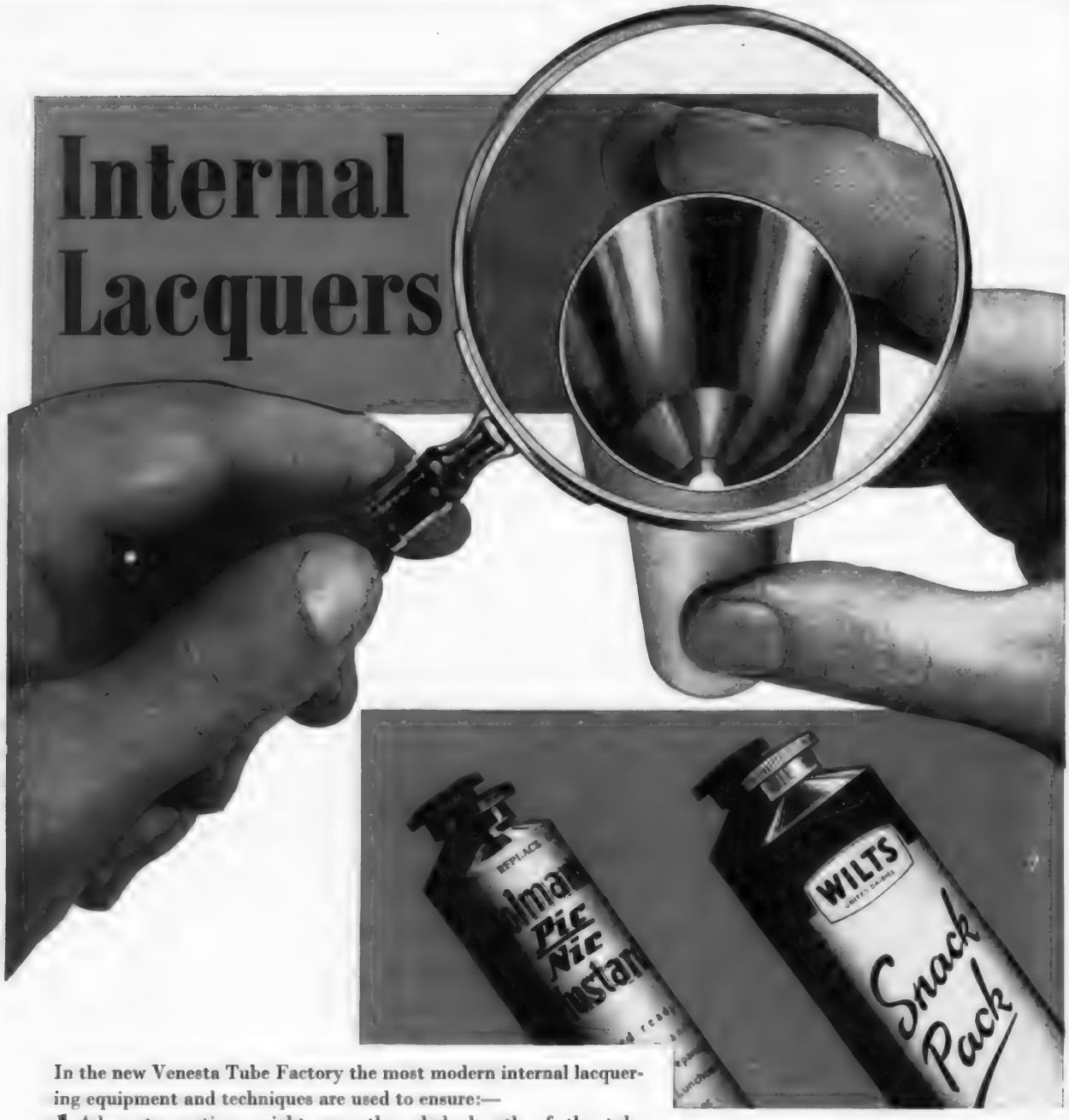
Internal Lacquers



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3 Adhesion to the tube walls and maximum flexibility to prevent cracking and flaking during use.

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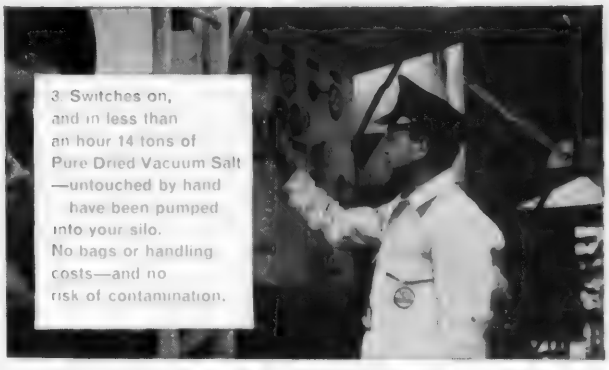
Single handed, he can fill your silo with 14 tons of Pure Dried Vacuum Salt in less than an hour.


3. Switches on, and in less than an hour 14 tons of Pure Dried Vacuum Salt —untouched by hand have been pumped into your silo. No bags or handling costs—and no risk of contamination.

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Photographs by courtesy of Kellogg Co. of Great Britain Ltd., Manchester.

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60 OR 120 LABELS A MINUTE

12 IMPORTANT POINTS TO NOTE:

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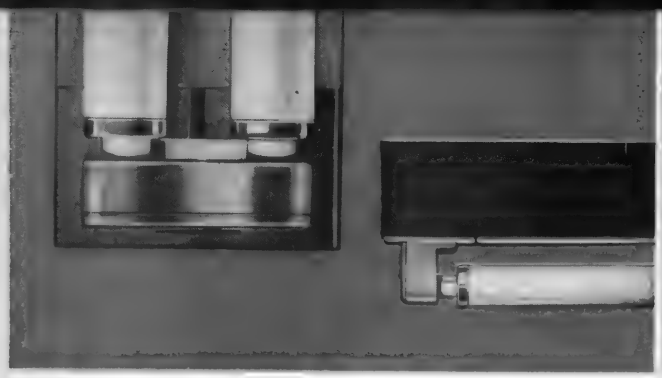

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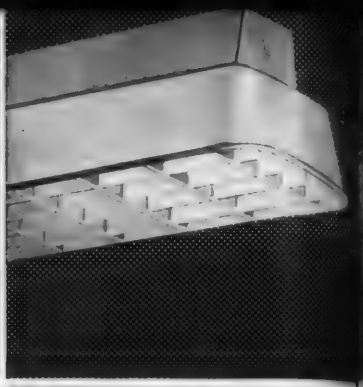

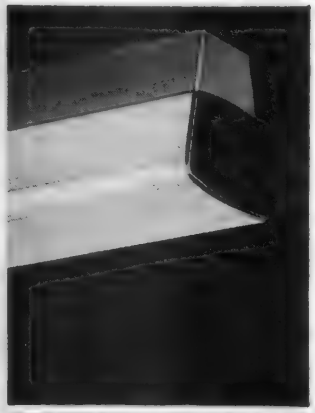

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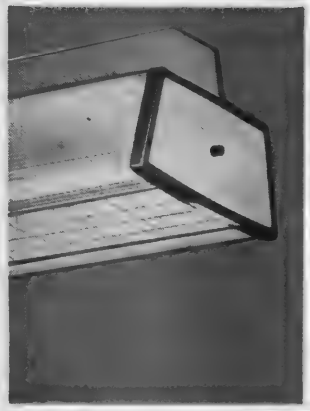

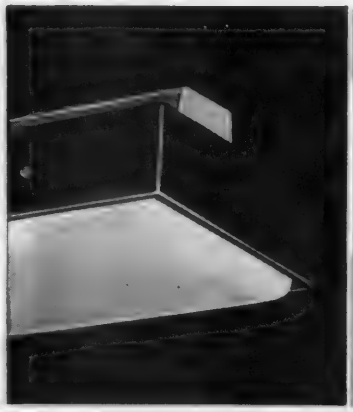

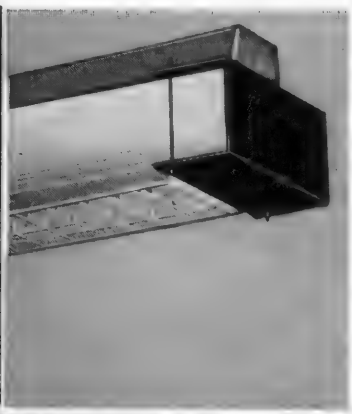

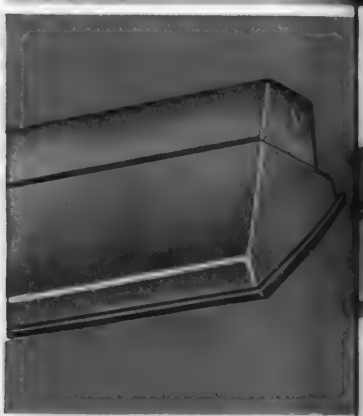

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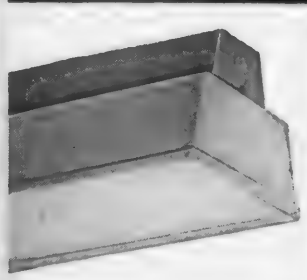

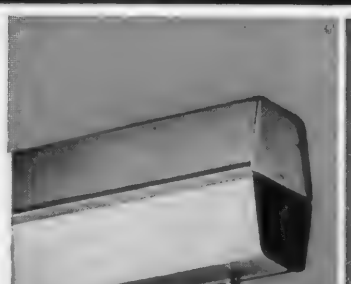

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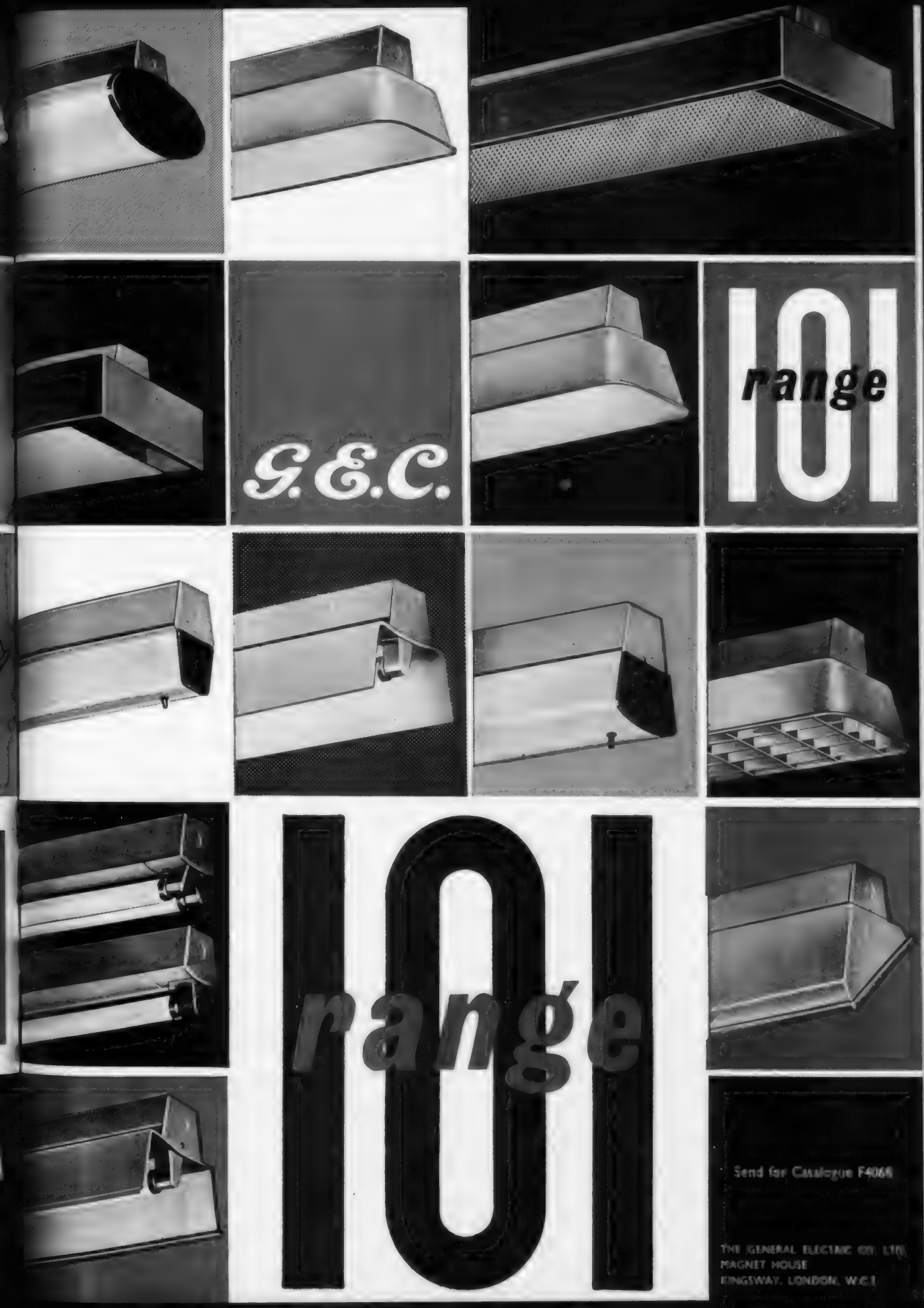
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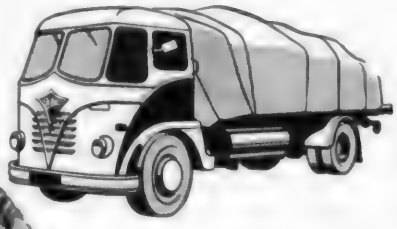

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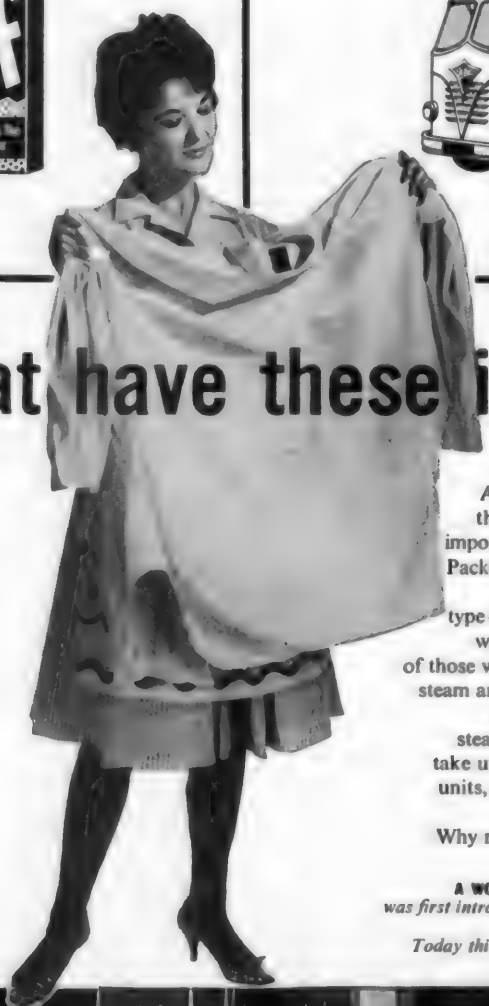

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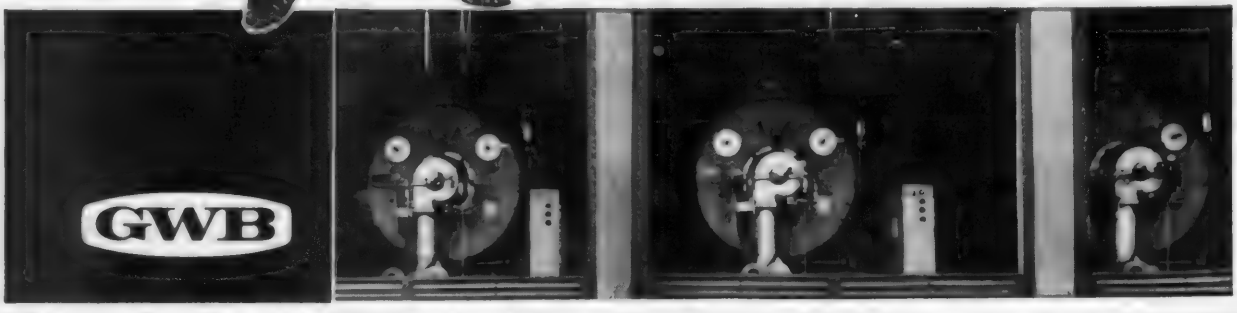

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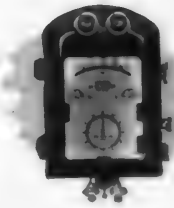

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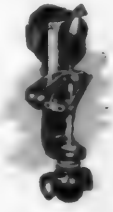
Air or water operated controllers; expansion stem type.

On-off electric control. Available with a wide range of thermostatic switches.

Self-operated controllers, for calorifiers, tanks, etc.



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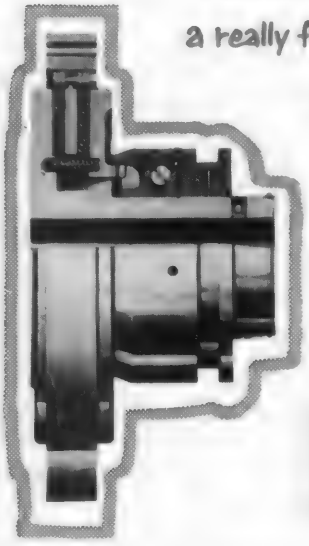

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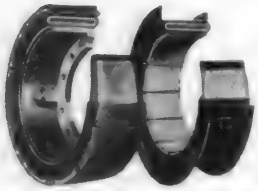

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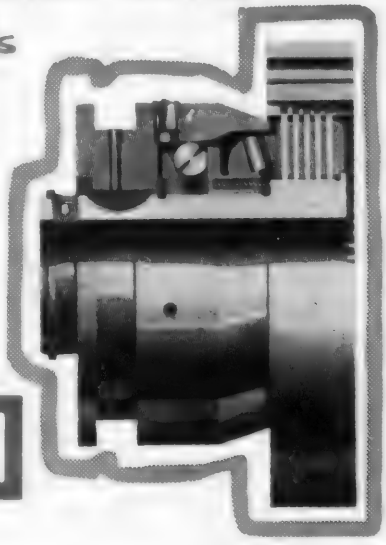
- Drives in either direction of rotation
- Mechanisms with or without adaptor rims available from stock

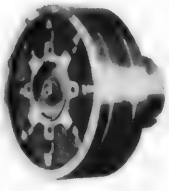


Single mechanism only (double mechanisms available).

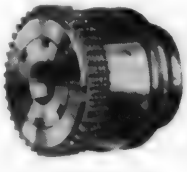
We can also supply

★ Complete clutch couplings for connecting two shafts
★ Clutches with pulleys, chain sprockets or gear wheels
★ Clutch mechanisms only, to build into your machine

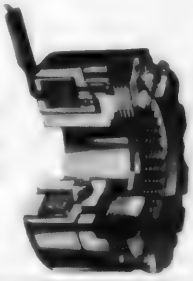
Automatic Centrifugal Clutch Publication 5722



BOM-L Multidisc Clutches and Brakes Publication 855



Magnetic Clutches and Brakes Publication 5756



Makers of:

Clutches, Conveyor drives, Couplings of all types, Double helical gear units, Fabricated steelwork, Geared motors, Hydraulic couplings, Iron, steel and non-ferrous castings, Machine-cut gears of all types, Motorised rollers, Patent Taper-flushbushes, Plummer blocks, Shaft-mounted gear units, Special Machinery drives, Spiral bevel gear units, Turbine gears, V-rope drives, Variable speed drives, Worm reduction gears.

CROFTS (ENGINEERS) LIMITED

POWER TRANSMISSION ENGINEERS

Head Office: Thornbury . Bradford 3 . Yorkshire

Telephone: 65251 (20 lines) *Telegrams:* "Crofters, Bradford Telex", Telex 51186

A packet of trouble?

If you are concerned in the packaging of a sensitive product (i.e. one that is liable to taint by taste or odour) you may land yourself a packet of trouble if you omit to consider carefully the packing material. To ensure against tainting you must choose a taint-free folding box board . . . which means a pure board containing no repulped material . . . which means a board made only from virgin spruce fibres . . . which undoubtedly means SCANDINAVIAN. SCANDINAVIAN pure folding box board has all the qualities required . . . lightness, whiteness, rigidity and an excellent printing surface . . . *plus* absolute freedom from taint. You will come round to SCANDINAVIAN sooner or later . . . you might as well enquire *now*.

SCANDINAVIAN

PURE FOLDING BOX BOARD

SCANDINAVIAN PACKING FOR SENSITIVE PRODUCTS

The name Scandinavian guarantees a pure folding box board produced by the associated box board manufacturers of Finland, Norway and Sweden.

Ask your boxmaker or agents of the FINNISH, NORWEGIAN AND SWEDISH FOLDING BOX BOARD MILLS
OR WRITE TO THE INFORMATION DEPT., P.O. BOX 7232, STOCKHOLM 7

CVS-17

"... a dragon gules on two coils of sheet steel proper..."

THE Norman-English description of the emblem of The Steel Company of Wales Limited is couched in the language of an age when "product identification" was, quite literally, a matter of life or death. Coats of arms were invented to distinguish friend from foe in battle.

In modern business, product identification is also a matter of life or death. Customers may intend to buy your product; but if they can't recognize it, the chances are they'll buy your competitors'. You naturally rely on your pack to guide their preference your way. Have you ever thought of the great advantages tinplate can give you in product identification?

NEW COLOURFUL PACKS

Tinplate can take 4-colour printing in reproduction equivalent to that on the finest art-paper. If you print your product's emblem on tinplate it will stand out because of its accuracy and its vividness.

You can design beautiful new, colourful packs; and their brilliance will be faithfully portrayed on tinplate. For unmistakable, hard-hitting product identification, tinplate is unsurpassed.

All this is another "plus," added to the established advantages of tinplate as the leading packaging material. Tinplate, being made of sheet steel, gives a product permanent protection in any climate; it is almost infinitely adaptable; and tinplate packs are easy and economical to store and handle.

If you have a packaging problem it will be well worth your while to seek the advice of The Steel Company of Wales Limited. The Company prides itself on giving individual attention to its customers' individual needs. Our specialists will give you most willing help.

THE STEEL COMPANY OF WALES LIMITED

Tinplate Division: CARMARTHEN ROAD, SWANSEA, GLAMORGAN

Telephone: Swansea 51571 Telegrams: Welshplate, Swansea

UGB

For quality and service

UNITED GLASS BOTTLE MANUFACTURERS LTD.

8 LEICESTER ST., LONDON, W.C.2 *Tel.*: Gerrard 8611 (23 lines) *Grams.*: Unglaboman, Lesquare, London.

THE STORY OF THE PERSIAN BEER BARREL

The fungus stereum subpileatum breaks down the cell structure of the wood

The mind of the beer drinker boggles indeed when he finds his pint smells of cheap scent . . . and that is what might have happened to many a man in the Spring of 1957, when he ordered X's Best Bitter.

The trouble was traced back to the barrels; the Persian oak from which they were made was infected with a fungus, living in the depths of the wood, that gave the beer its unwelcome perfume.

Oxoid Wort Agar then came into the story. Specimens of infected wood were incubated in the Agar, and tests were carried out to discover effective ways of killing the fungus. The normal steaming of staves would kill the fungus, but reinfection could occur from unheated heads of casks.

FOR PROGRESSIVE LABORATORIES **OXOID** **CULTURE MEDIA**

The use of Oxoid Culture Media ensures constant quality and uniformity in your laboratory technique. Absolutely reliable, quick, convenient and economical, Oxoid Culture Media are available in tablet or granular form. Full details from: Oxoid Division of Oxo Ltd., Thames House, London, E.C.4 (CENtral 9781).

Really safe paints . . .

Bottle Washing Machine treated with Evokote Type 21 at the Streatham, London, factory of Messrs. United Dairies Ltd.

for the Food Industry

✳ *Proof against mineral and organic acids, gases, steam, caustic soda, detergents, abrasion.*

EVOKOTE

EPIKOTE RESIN BASED PAINTS

✳ *Combined maximum chemical and corrosion resistance, with hardness, adhesion and flexibility.*

A PRODUCT OF EVODE OF STAFFORD

Manufacturers of BITUGEL, EVODYNE and EVO-LED paints

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EQUILIBRATION

perfect balance on all points

Whatever the product, perfect balance or "Equilibration" of materials used plays a vital part in the perfection of the ultimate product. Skinless Sausages are no exception, and carefully balanced ingredients need "Equilibration" in the casings used to ensure a perfect balance of product. Such casings—WIENIE-PAK "Equilibrated" are now available.

EQUILIBRATED CASINGS offer :

- **Uniform calibration**
- **Consistent filling**
- **Easiest nozzle control**
- **Easiest peeling**
- **Greatest Strength**

OPPENHEIMER research extends to all aspects of Skinless Sausage Production. In addition to supplying WIENIE-PAK "Equilibrated," OPPENHEIMER offer a service on recipes, production methods, marketing schemes, etc., which will help you to get your share of this Growing Market.

FOR SKINLESS SAUSAGES AND FRANKFURTERS

WIENIE-PAK

"EQUILIBRATED"
Skinless Casings

For Full Technical Information service write:

THE OPPENHEIMER CASING CO. (U.K.) LTD.

159-165 Harrow Road, London, W.2 *Tel.: PADdington 7431-7*

EDINBURGH: Fountainbridge 1403/4 BELFAST: Carryduff 274 DUBLIN: Dublin 889206

HERE'S MORE PROFIT FROM HAMBURGERS & PATTIES

The HOLLYMATIC way

See it and you'll believe it! Up to 2,100 patties or Hamburgers an hour, exactly the size and shape you want, can be produced by the amazing new Hollymatic.

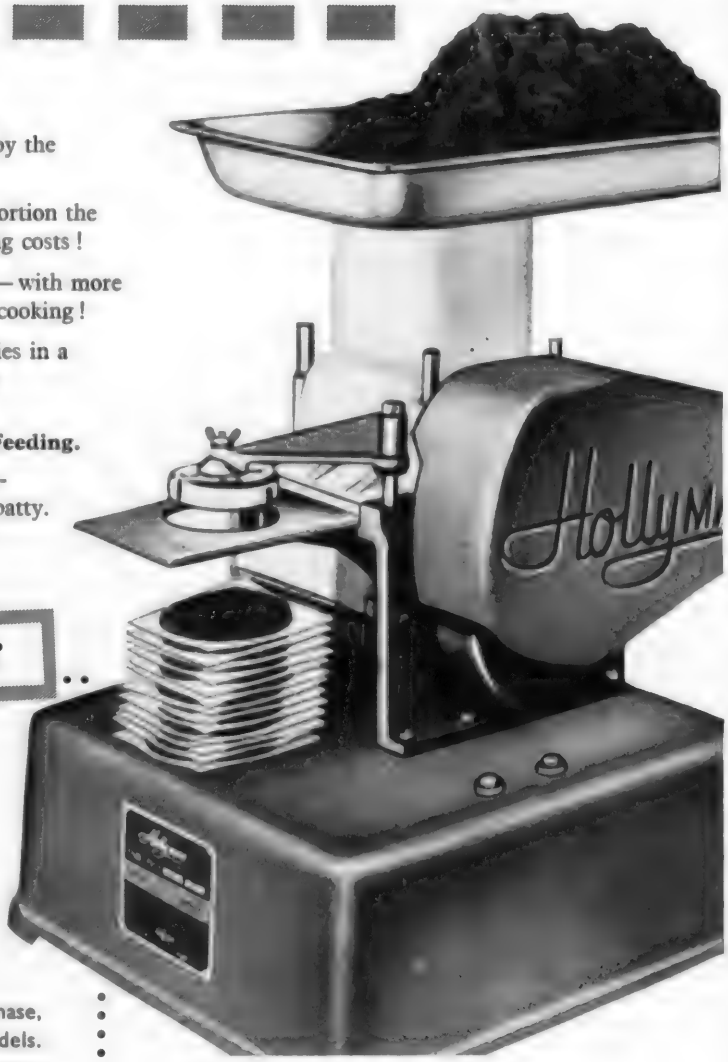
Gives ABSOLUTE PORTION CONTROL — each portion the size you decide on, so essential in controlling costs!

Produces MORE PATTIES per pound of meat — with more succulent texture, less shrinkage and faster cooking!

SAVES TIME AND LABOUR — by moulding patties in a great variety of materials and stacking them automatically on paper.

* **Only Hollymatic gives Automatic Paper Feeding.**

The only patty moulding machine that automatically feeds the patty paper under each patty. Eliminates manual work and allows you to use the most advantageous sheet size.



SPECIFICATIONS

PATTY SIZES AND SHAPES
Standard shapes are round or square. Equipment to make odd shapes available at additional cost. A separate hopper bottom is required for each thickness of mould plate used; these may vary from $\frac{3}{16}$" to $\frac{3}{4}$" and can be changed quickly and easily.

ELECTRICAL SPECIFICATIONS
Equipped with a $\frac{1}{3}$ h.p. Capacity type, single phase, 60 cycle motor, in either 110 or 220 volt models. Three phase, direct current, 50 or 25 cycle motors can be supplied at additional cost.

DIMENSIONS
The Hollymatic is 26$\frac{3}{4}$" long x 18$\frac{1}{2}$" wide by 27$\frac{3}{4}$" high.

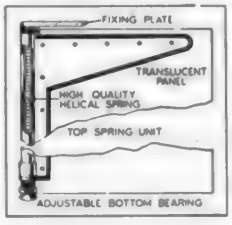
WEIGHT
The Hollymatic weighs 180 lbs. complete.

Write for details or Telephone

STOKES & DALTON LTD
VICTORIA SPICE MILLS, LEEDS, 9
Tel: Leeds 31701 (10 lines)

What is a door?

The dictionary defines a door as "a barrier at the entrance to a room or building". Every building has a door, and each door has its problems. In factories, hospitals, warehouses and offices, in fact wherever there are doorways constantly used by traffic, there is need for a door that will eliminate accidents and withstand damage. Neway Translucent Doors do just this. The doors are fitted with plastic panels which allow objects on the other side to be seen in shaded form whilst still retaining privacy. The panels are flexible and yet close tight enough to seal out draughts and noise. Smart, easily cleaned, and self-closing, they absorb shock and blows from passing traffic without damage either to the traffic or to themselves. Neway Translucent Doors are available in sizes up to 8′ × 6′ per pair, and can be installed in existing frames. Once fitted little or no maintenance is ever needed.



The framework of the door consists of a vertical tube which fits close to the door frame. Concealed in the top of the tube is the patented double action return spring—this is fully adjustable and ensures that the door is self closing. The door pivots at the top and bottom on axles let into the lintel and into the floor.

NEWAY

Translucent Doors

Write now for free leaflet giving full information about Neway Translucent and Rubber Doors

WILLIAM NEWMAN & SONS LTD. (Dept. TC1) HOSPITAL STREET, BIRMINGHAM 19

HYGIENIC SIZE REDUCTION FOR ALL FOOD PRODUCTS

The Scott-Rietz Angle Disintegrator is designed to give uniform fine grinding with instantaneous homogenizing and is particularly suitable for baby foods, potted meats, fish pastes, vegetable purées, tomato and fruit juices. Built to the highest standards of hygiene, all contact parts are of stainless steel and can be rapidly dismantled for cleaning.

The machine operates at high speed and is fitted with a full 360° screen giving uniform fine grinding and constant particle size. The exclusive Scott-Rietz Differential Discharge can be fitted to separate waste materials from the primary product. Special belt drive provides for change in speed and oil-mist lubrication can be provided if required. Scott-Rietz Disintegrators can be supplied in three sizes with rotor diameters of 6 in, 8 in, and 12 in.

Please write for Bulletin No. 119 which gives details of Scott-Rietz Food Processing Equipment.

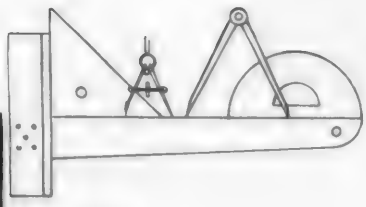
GEORGE SCOTT & SON (London) LTD.

HEAD OFFICE: *Leven, Fife, Scotland.*
Phone: Leven 344. Grams: Niobate, Leven, Fife.

LONDON OFFICE: *Artillery House, Artillery Row, S.W.1. Phone: ABBey 2121 Grams: Niobate, Sowest, London.*

ONE OF THE BALFOUR GROUP OF COMPANIES SR7

Photo by courtesy of Scribbans-Kemp Ltd.



PLANNED DESIGN

—Worth looking into if you plan to handle and store ingredients in bulk

Tailor-made to your requirements | Tried and tested under various conditions at home and overseas | Perfect hygiene | Automatic control | Complete flexibility in conveying | Economies of labour and effort | These are the advantages of **PLANNED DESIGN**, *the Baker Perkins system of pneumatic bulk handling and storage |*

Among

PLANNED DESIGN

features are:—

* Specially-protected steel storage bins manufactured to the strictest possible standards of hygiene.
* Elimination of infestation-carrying ledges.
* Pneumatic system throughout: no infestation dangers from mechanical dischargers or conveyors.
* Weighing with pneumatic feed that gives flexibility of layout and simplicity of control.
* Precise weighing of flour, sugar and similar ingredients. Patented electro-magnetic piston valve gives instant and automatic closure, accurate weigh-off.
* Pneumatic blending.
* Automatic 'topping up' device which ensures that service bins are immediately filled with correct blend.
* Feeding equipment designed to suit individual mixing processes and backed by Baker Perkins' long experience of mixing machines.

These and many other special features of

PLANNED DESIGN

pneumatic installations are supported by Baker Perkins' comprehensive service organisation.

BAKER PERKINS
Engineers
WESTWOOD WORKS · PETERBOROUGH

BP 105

C.P-Sellers
HYDRAULIC JET CLEANERS
reach and clean where nothing else will

C.P-Sellers units with adequate cold water and steam of not less than 40 lbs p.s.i. eliminate every cleaning problem.

The impact and hydraulic scrubbing action completely removes dirt, grease and soil from walls, floors and machinery. When required detergents can be metered economically.

The C.P-Sellers Rotor Jet cleans the inside of tanks completely, safely . . . automatically discharging at high pressure — hot or cold water with or without solvents or detergents.

Get the facts from the leading heavy duty cleaning equipment manufacturer.

Also specialists in continuous and batch processing plant and equipment for controlled heating and cooling with mixing and aeration.

THE CLEAN AIR ACT and Fuel Efficiency

Have you taken ACTion yet? We offer priority to firms wishing to **abolish smoke emission** by the installation of mechanical stokers:-

UNDERFEED "LOW RAM" CHAIN GRATE

Application can be made for a government loan to purchase or we can supply on rental. Most mechanical stoker installations will pay for themselves in coal saving alone within the first one or two years.

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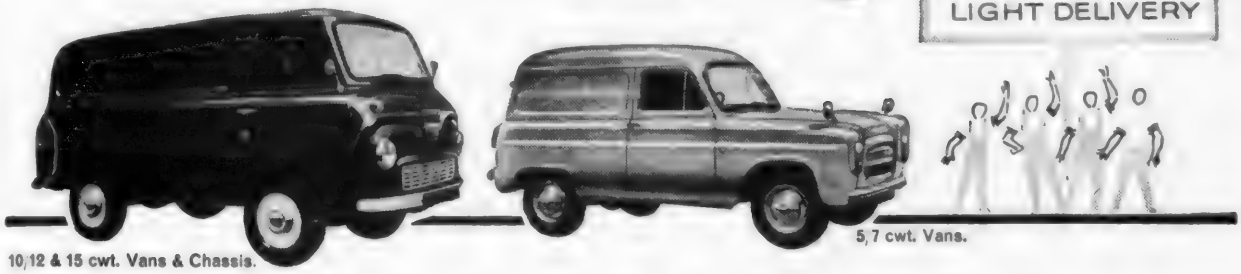
TRANSPORTING

Trader Trucks 30 cwt.-7 tons.

LIGHT DELIVERY



10/12 & 15 cwt. Vans & Chassis.

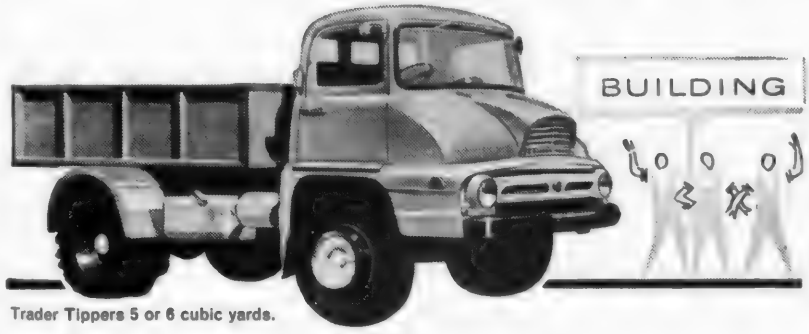
5/7 cwt. Vans.

TODAY'S TOUGHEST TASK FORCE!

THAMES ARE ON PARADE! At Earls Court—and at your local Ford Dealer's. See them all . . . ask questions . . . check opinions—and join the great swing to Thames! *For sheer size* today's Thames range is the greatest ever. Long haul to local delivery . . . there's a smooth-styled Thames on which you'll paint your name with pride. *Thames says 'no delay!'* Thames cuts out cost-inflating delays, with power and strength in reserve to stay on the road longer . . . car-styled cabs for fatigue-free drivers . . . maximum manoeuvrability for turning in tight corners . . . easiest accessibility for maintenance—plus Ford Service. Thames are styled-right-through for today. See them—study the detailed specifications—*and specify Thames!*

SEE THE SHOW ON THE FORD STANDS 24 & 72 AT THE COMMERCIAL MOTOR SHOW . . . AND IN YOUR DEALER'S SHOWROOM.

BUILDING



Trader Tippers 5 or 6 cubic yards.

HEAVY DELIVERY

Semi-forward control 2 ton Van (and Trucks 30 cwt.-4 tons).

THAMES

There's a THAMES for every trade TRUCKS & VANS

AND WORLD-WIDE FORD SERVICE TOO!

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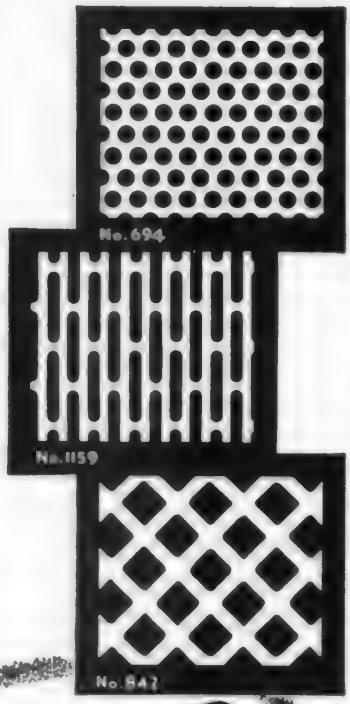
Production Standards...

... in the Food Manufacturing, Preparation and Allied industries, would not be possible without Mr. Therm's **HEATSERVICE** freely available from every Area Gas Board.

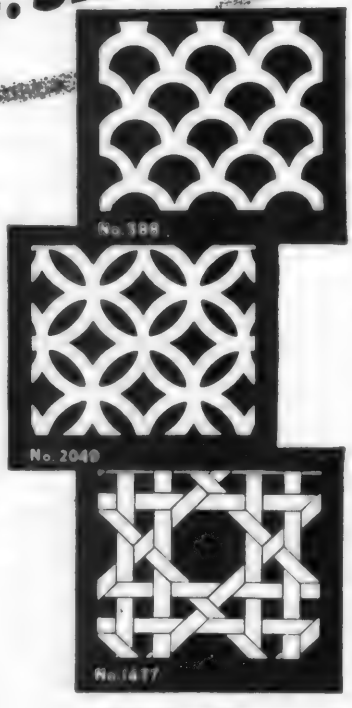
MR. THERM *BURNS* TO SERVE YOU *ALWAYS* in all ways

AND – 11 million housewives cook by GAS!

Now you can use



PERFORATED P.V.C. SHEET



PATTERNS
Wide range available. Patterns shown here half size are typical examples.

SHEET SIZES
54″ × 24″, 36″ × 36″, or 72″ × 36″, depending on colour and thickness.

THICKNESSES
From 6/1000″ to 250/1000″ depending on sheet size and colour.

COLOURS
Choice of 5 Transparent and 21 Opaque Colours. Also Clear and Natural Transparent.

Please send for List No. FD995

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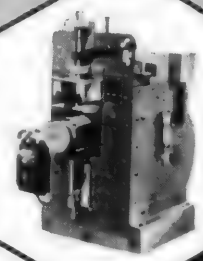
It must be NEWMAN *for labelling & packaging equipment*

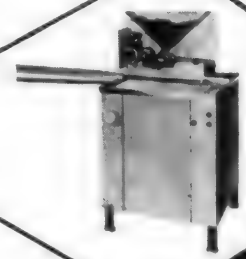
LABELLING MACHINES,
Bench Model, Semi Automatic

Gum and apply labels to small and medium bottles, packs etc.
Quick change-over.
Strip Gumming Model 23A
Fully Gumming Model 3C



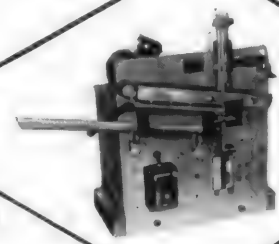
VIAL & AMPOULE PRINTING MACHINE

High quality printing. Double impression offset system using quick drying or ceramic inks.
Variable speed control.
Quick change-over
Model IF



LABELLING MACHINE
Bench Model, Automatic

For ampoules, vials, crayons, tubes, torch cells etc.
Label coding available.
High quality labelling due to sustained pressure on label after application.
Model 2B.



See our display at the
PACKAGING CENTRE
50 Poland Street, London, W.1
Open weekdays from 10–6

LABEL GUMMING MACHINE
Self feeds labels from simple magazine. Motorized. Touch-bar control. High speed operation.
Model ID.

D. TRAPOW & CO. LTD.
ENGINEERS
113/115G, REGENTS PARK ROAD, LONDON, N.W.1.
Telephone PRImrose 6683.

THE INFORMATION SUPPLIED
IN THIS ADVERTISEMENT IS OF

Vital Importance to the Food Industry

IN the food producing industries, as elsewhere surfaces must be considered unsatisfactory from the point of view of true hygienic conditions.

Microbes, disease producing and otherwise can thrive on them and apart from painting with traditional Fungicidal Paints (the more effective of which are poisonous and all are only of temporary value) and/or cleaning with antiseptic washes, of doubtful value even temporarily, no means exist of combating objectionable mould growth and the danger of cross-infection from such surfaces, with all the consequent losses and troubles.

It is obvious that if these surfaces could be made reliably and continuously self-sanitising, i.e. capable of destroying microbial life deposited on them, then the growth of mould would cease, and the deterioration of produce from cross-infection and the risk of the spread of disease would be considerably reduced.

A new process

Paints by The Dentolite Process—Fungi-Chek Gloss, Fungi-Chek Matt, Fungi-Chek Emulsion Paint, Fungi-Chek Concrete Floor Finish—the latest advance in paint technology, enable continuously self-sanitising surfaces to be created by painting. They are non-poisonous, finest quality finishes in a complete range of types and shades made fungicidal and bactericidal by a unique reaction (The Dentolite Process—World Patents applied for) which takes place during the formation of the film and lasts throughout its entire life. Thus, the remarkable sanitising effect is not obtained by the normal method of making 'fungicidal' paints, i.e. by incorporating a large enough percentage of poisonous chemicals. The effect of this type of paint is due to the leaching out or evaporation of the additive, and so the fungicidal action is, as stated above, only very temporary; further, there is not necessarily any anti-bacterial effect at all.

Harmless—non-poisonous

Paints by The Dentolite Process are free from any toxic compounds of lead, arsenic, copper, mercury, tin, or any harmful or poisonous chemicals. All types are non-poisonous and absolutely harmless to men or animals.

Protection and prevention

As surfaces painted with paint by 'The Dentolite Process' inhibit the growth of micro-organisms throughout the entire life of the film, then the risk of produce being affected by cross-infection from such surfaces will be very considerably reduced, if not entirely eliminated. The growth of unsightly and objectionable mould will even under the most, adverse conditions, be prevented.

Costs no more

Fungi-Chek paints cost no more than normal paints of similar quality. As types for all decorating and industrial purposes are now available for application by brush, spray or roller, and in a range of modern shades, Fungi-Chek is now considered the only paint which meets the decorative, functional and hygienic requirements of the food producing industries.

The claims made for The Dentolite Process have been substantiated by Pathologists, Bacteriologists, Mycologists and Scientific Authorities throughout the world, and Denton Edwards' Licensees are now manufacturing paints by this process in most countries.

Full descriptive literature, copies of reports, samples, shade cards, etc., will gladly be sent on request.

DENTON EDWARDS PAINTS LIMITED

Manufacturers of Fine Paint for over 160 years

ABBEY ROAD · BARKING · ESSEX · Telephone Rippleway 3871 (10 lines)

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TOMATO PURÉE — Double and Triple Concentrate

WHOLE PEELED SAN MARZANO TOMATOES

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Produced and Packed in Six Modern Factories Throughout Italy
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CROSSE & BLACKWELL

rely on

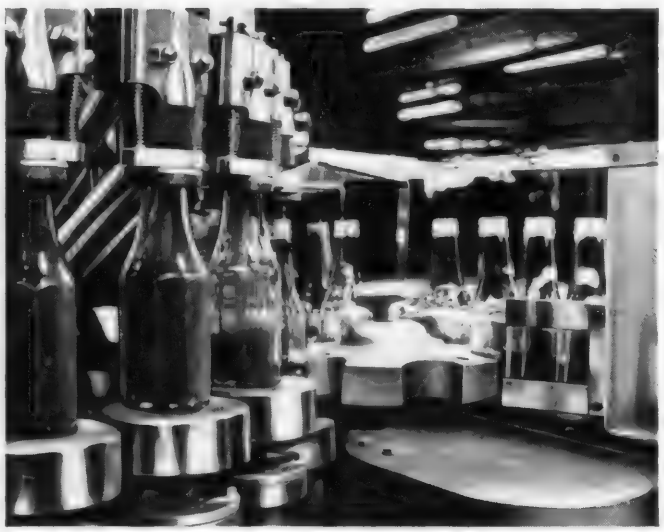
ALBRO

Like so many important food manufacturers, Messrs. Crosse & Blackwell Ltd. depend on ALBRO automatic filling machines to maintain big, sustained output.

The ALBRO 24-head vacuum-operated machine illustrated is one of the many installed at the Crosse & Blackwell factories. It shows bottles entering on the feed side for tomato ketchup filling.

ALBRO filling machines are utterly reliable; fill to exact level without spill, drip or mess; reject damaged bottles; are quickly and easily cleaned because the design is simple and all parts in contact with the product are made of stainless steel.

ALBRO filling machines are made in a wide range of capacities for handling liquids, semi-liquids, powders and pastes. Ask for details and a demonstration.

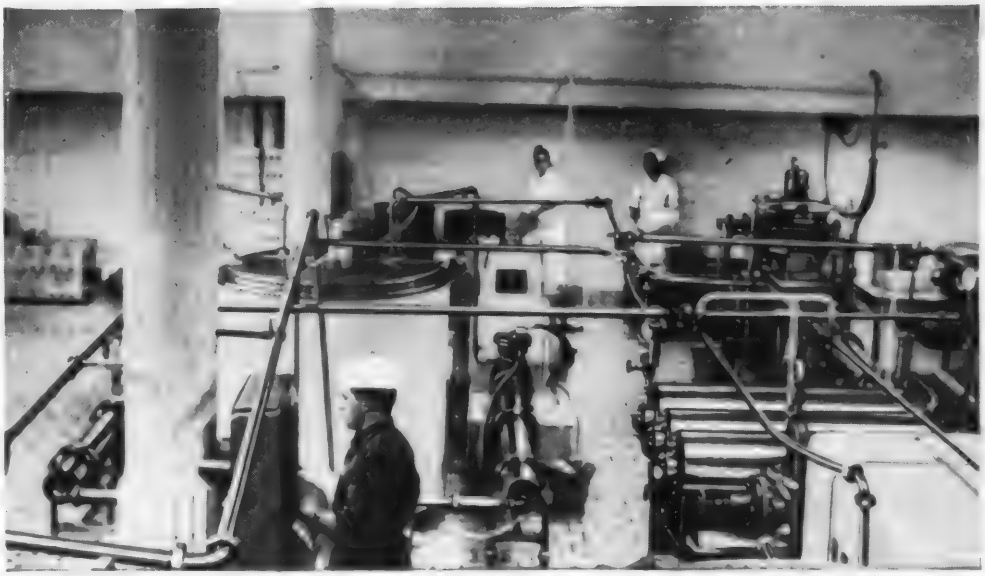


ALBRO Filling Machines for Liquids, Powders & Pastes

ALBRO FILLERS & ENGINEERING CO. LTD., WHARF ROAD, PONDERS END, MIDDX.

Telephone: Howard 2622 (5 lines) *Telegrams: Albromach, Enfield.*

Modern Margarine Making



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WITH THE

★ Votator *continuous* PROCESSING APPARATUS

The high throughputs reached with Votator Apparatus require only a fraction of the staff employed to give a similar output by other methods. The plant requires virtually no supervision and the resultant product is superior in texture and flavour—with unvarying uniformity. The margarine arrives at the packing machines untouched by hand, via the Johnson Constant Pressure Buffer Units.

All over the world Votator Continuous Processing Apparatus is being used for automatic production of **Margarine, Lard, Marshmallow, Soups, Sauces, Gelatine, Turkish Delight, Starch Jelly, Biscuit Cream,** and many other well-known foods and sweets. The final product is superior in texture and flavour.

★ *"Votator" is a trade mark which applies only to the products of the Girdler Co. or their licensees*

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Ask for the services of our Process Engineers and fully equipped Votator Laboratory for developing new applications or improving existing ones for continuous heating, cooling, crystallising, etc., of viscous or liquid materials by closed-processing plant.

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Johnson's

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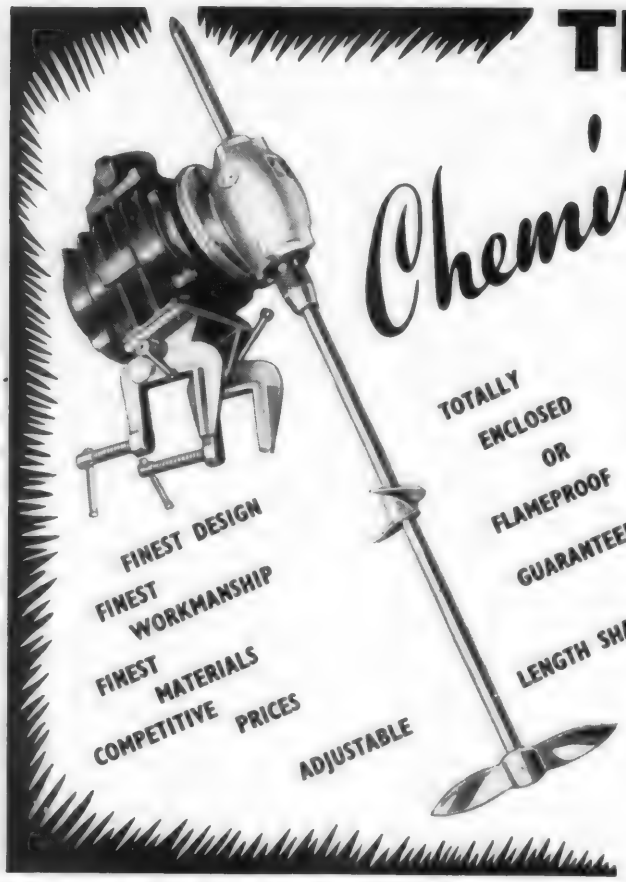

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Illustration shows a standard type CMS/A/FP4 Medium Speed, Heavy-duty geared, general purpose mixing unit. Fitted with flameproof motor and starter. The stainless steel agitator shaft is completely adjustable through the gearbox. The whole unit is mounted on heavy-duty brackets and clamps, for supporting the unit on the side of a vessel or other convenient supports.
These mixers can, of course, be supplied with Totally Enclosed motors to suit standard electrical supplies—they are also guaranteed.

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The DURATAX complete with Cake Beater, Wire Whisk and Dough Hook costs considerably less than other makes. Compare our prices. Additional attachments may be operated.

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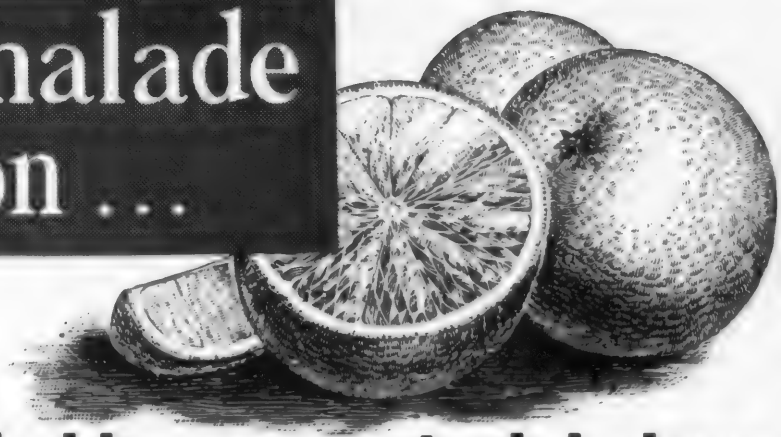

Offset probable raw material rises by installing the Kellie automatic

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CUTS LABOUR COSTS BY 90%

Oranges, Lemons, Tangerines, Grape Fruits, etc., from 1¼" to 3½" diameter cut automatically into quarters, irrespective of shape. No Grading required.

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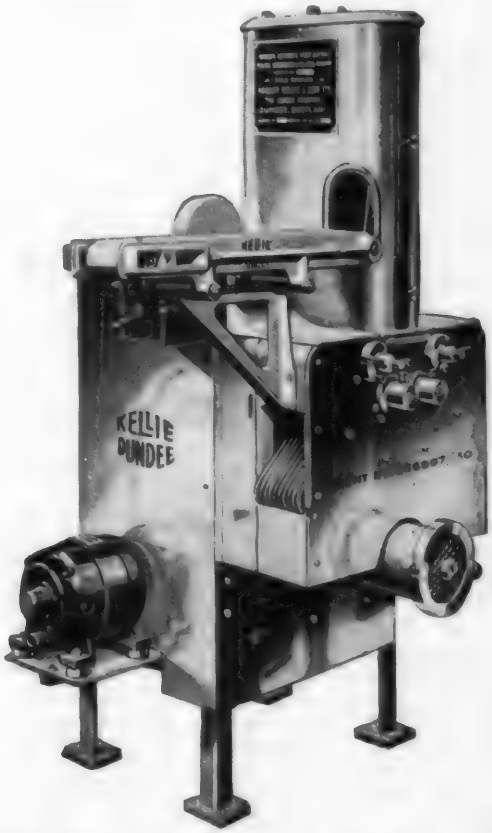
Peel, fruit pulp and juice are delivered separately at 12 lbs. per minute. The labour costs for this output SHOW A REDUCTION OF OVER 90% over handwork. This alone would enable the cost of the machine to be recovered in a few weeks.

The risk of skin disease to workers is absolutely eliminated with this machine.

Arranged for direct coupled electric motor or belt drive with fast and loose pulleys.



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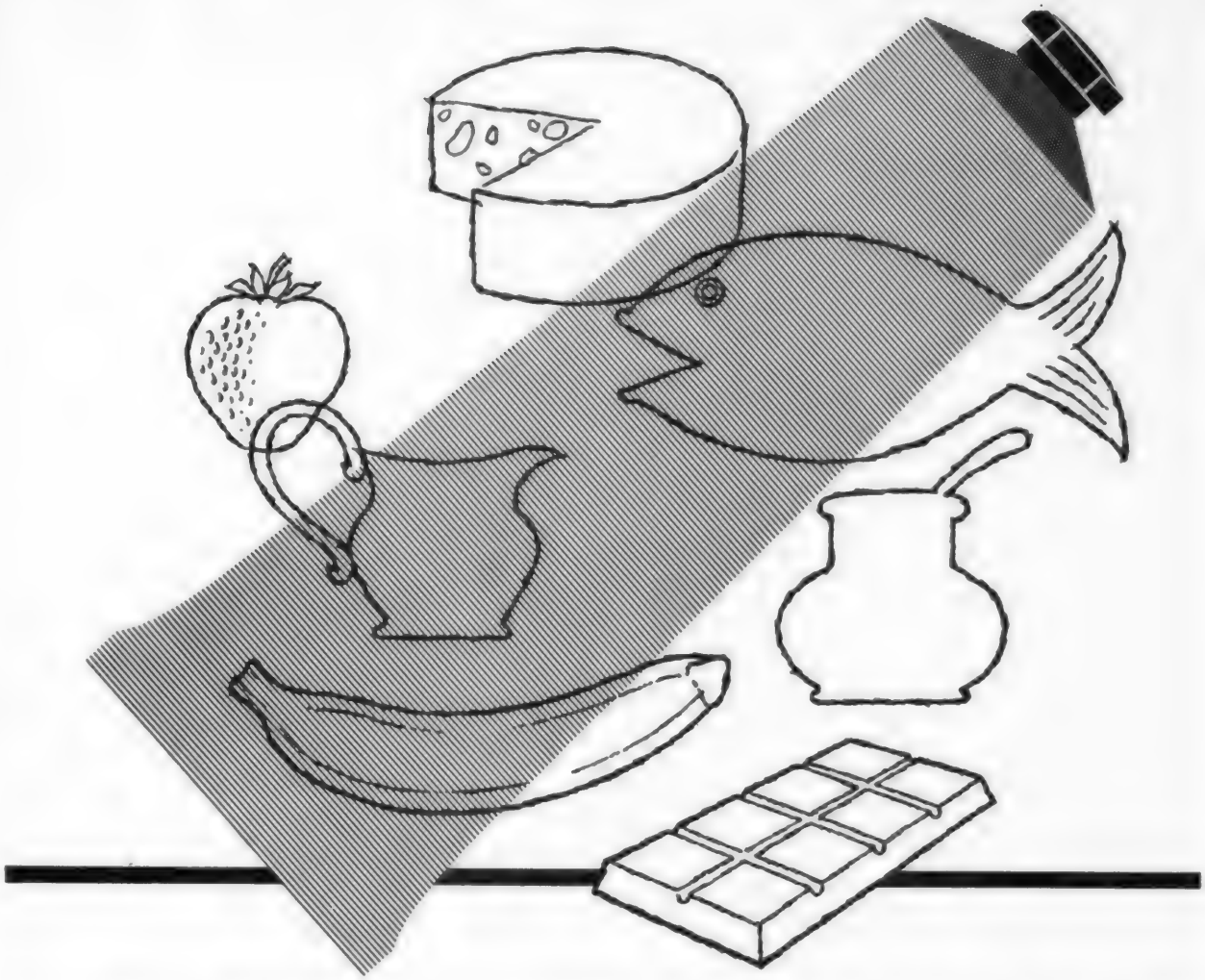

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*Be sure you get a copy of this new Flexile booklet about Food in Tubes.**

** Foods in tubes now include: fish pastes, condensed milk, golden syrup, cheese spreads, jams, mustards, jelly, cake decoration, vegetable concentrates, marmalades, gravy browning, sauces, chocolate spreads, mayonnaise, fruit concentrates, etc.*

if you're thinking about TUBES phone FLEXILE first

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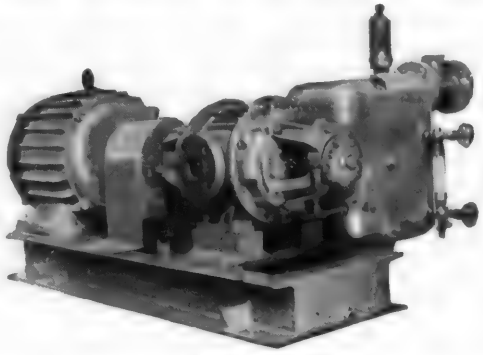

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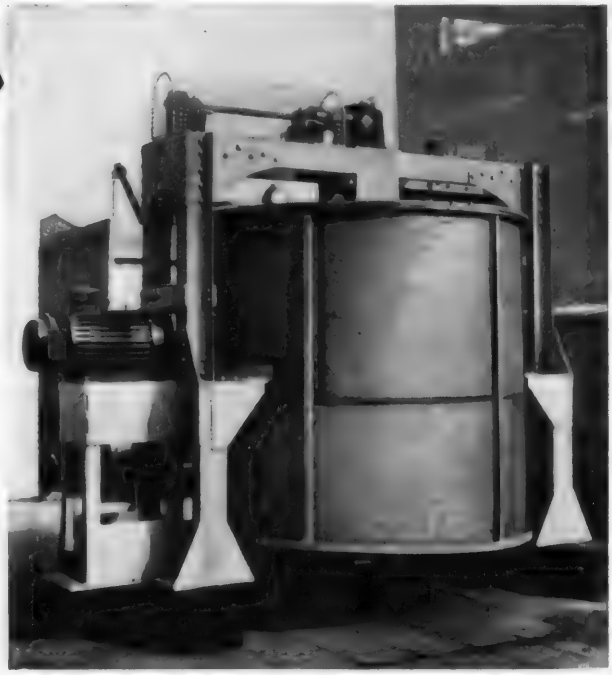
STAINLESS STEEL PLANT

Soundly designed and well made stainless steel plant for food processing will ensure:

- *Full flavour and original colour are maintained*
- *The risk of bacteria formation is eliminated*
- *Optimum economic plant life*
- *Maximum daily output as result of easy cleaning qualities*

May we make your next stainless steel food processing plant?



6'6" dia. insulated stainless steel sauce boiling vessel with all inside surfaces bright polished.

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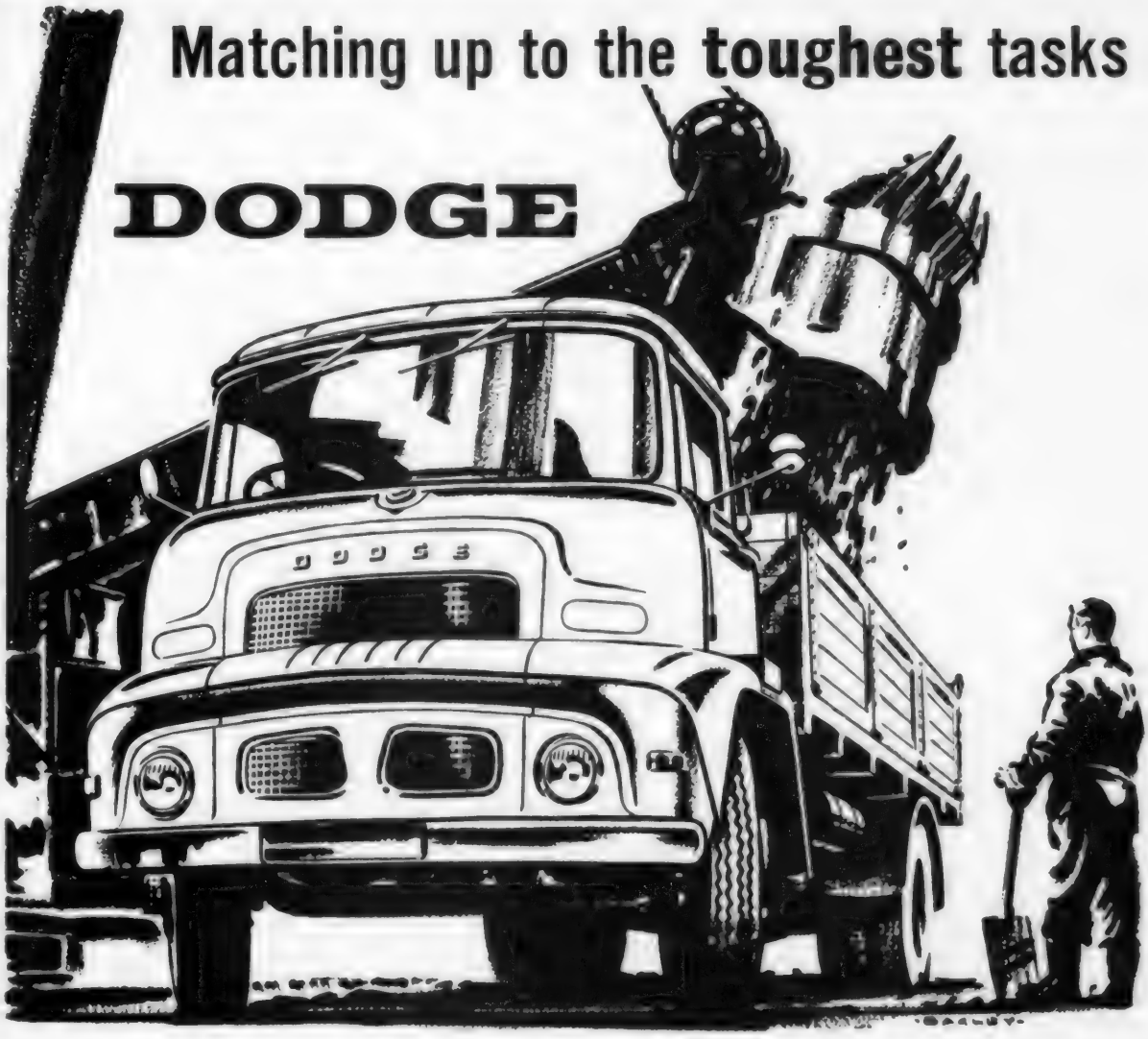

....the truck with built-in brawn!

Normal and Forward Control Models.

The Dodge Normal and Forward Control Series give you the choice of 42 different chassis types. Each is a payload leader with power and stamina to match. Each is a natural for hard, fast trucking work. The reason is simple! The Dodge is built up to a specification, not down to a price. And this gives it a decided edge when it comes to the bonus dividends which stem from maximum tonnage loads and added years of profit earning service.

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GEARED MOTORS
SPEED REDUCERS
SPEED INCREASE G/BOXES
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WHICH DETAILS OUR GENERAL RANGE OF PRODUCTION

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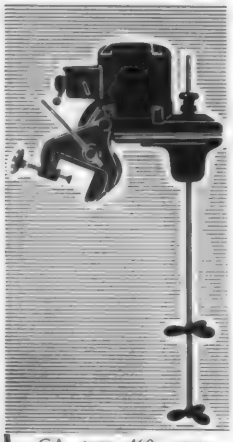
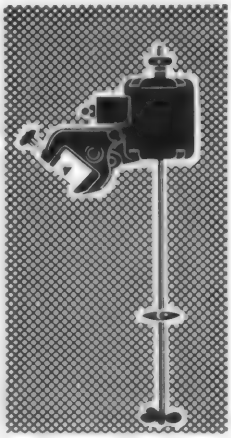
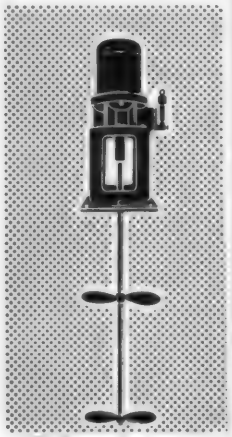


GA type 460 r.p.m. medium speed fluid mixer.



AD type 1450 r.p.m. high speed mixer.



GVD propeller type 460 r.p.m. heavy duty permanently mounted mixer.

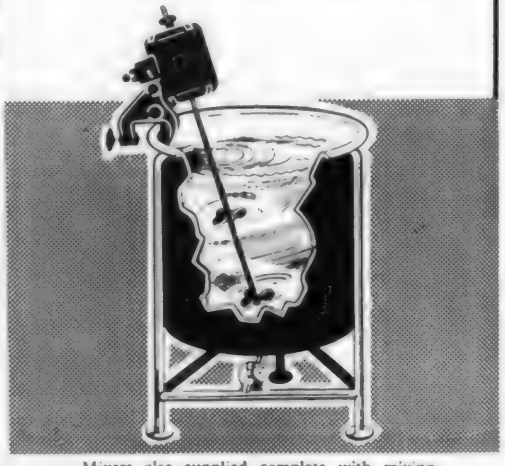
THE MITCHELL ORGANISATION

Fluid Mixing Specialists

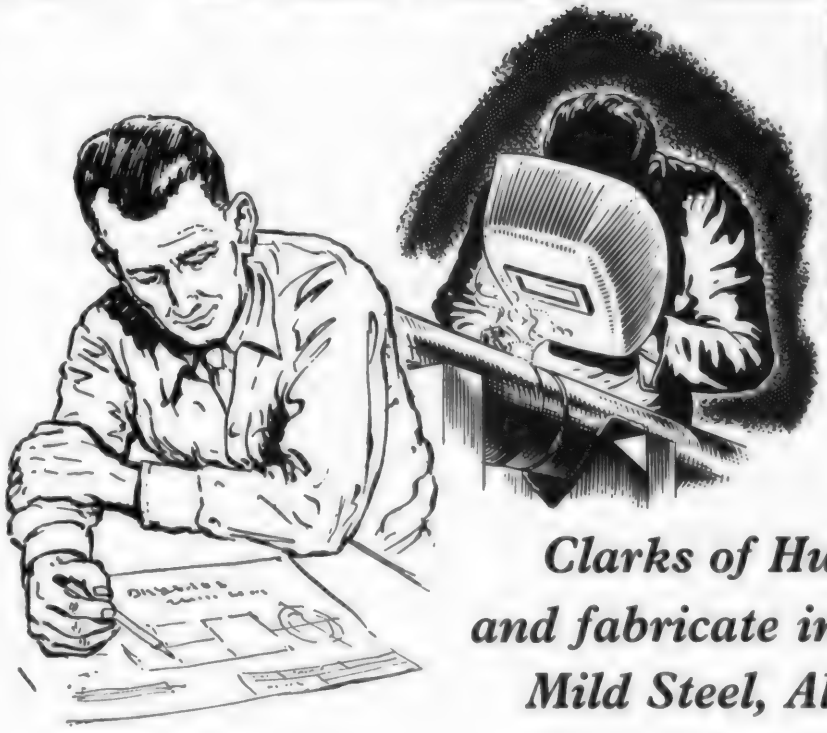
To the Foodstuffs Industry we can supply mixers for sugar syrups, sauces, soups, brine solutions for canning, essences, flavourings, aerated waters, marshmallow creams and edible oils.
As fluid mixing specialists our experience and 'know-how' gives you the best advice on fluid mixing problems, whether laboratory or large production scale.

L. A. MITCHELL LIMITED HARVESTER HOUSE, 37 PETER ST., MANCHESTER 2 TELEPHONE BLACKFRIARS 7224/7 AND 7824/7
LONDON OFFICE: PORTLAND HOUSE, 73 BASINGHALL ST., LONDON E.C.2 TEL. MET. 8321/3

There's a
MITCHELL MIXER
for every
industrial need



Mixers also supplied complete with mixing vessels and tanks.



Clarks of Hull now design and fabricate in Stainless Steel, Mild Steel, Aluminium, etc.

QUICKLY, ECONOMICALLY AND EFFICIENTLY

After leading the field for over a hundred years in the fabrication of copper vessels, expansion joints, etc. Clarks of Hull have now—to cater for fabrications in stainless steel, mild steel, aluminium, etc. —erected a completely new Fabrication Shop. Newly-equipped with the most modern processes and staffed with hand-picked, highly-experienced personnel, Clarks' Fabrication Shop is in a position to combine excellent deliveries with high standards of workmanship —probably giving you more for your money too! A skilled design service is available.

- **Metallic Arc Welding**
- **Argonaut and Argon-Arc Welding**
- **Stress-relieving and testing facilities**
- **Agents or representatives in all parts of the country**

Plate preparation bay—new Fabrication Shop

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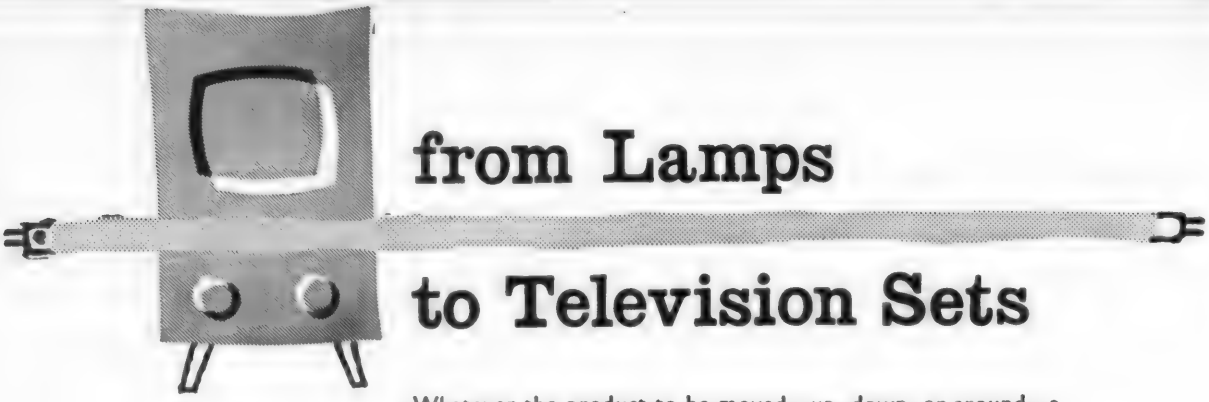

from Lamps to Television Sets

Whatever the product to be moved—up, down, or around—a Renold Chain is there to do the job.

With their all-steel construction, accuracy of manufacture, and high ratio of strength to weight, they are the hallmark of a first-class conveyor installation. These features mean the least power consumption for the load moved, and the avoidance of excessive weight in conveyor structures.

RENOLD **Chains for mechanical handling**

RENOLD CHAINS LIMITED · MANCHESTER —*the FIRST name in precision chain*

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COMMER

From the toughest name in transport

comes a tough new range!

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FORWARD CONTROL

4, 5 & 6 TONNERS

with 3-seat wide vision cab

and Commer medium diesel engine

- ★ Imposing, prestige-building cab of tough all-steel construction affords first-class driver comfort.
- ★ Deep one-piece windscreen gives wide, panoramic vision.
- ★ Separate driver's seat has horizontal, vertical, and rake adjustment.
- ★ Luxurious, deep foam-rubber seating provided for both driver and passengers.
- ★ Perfectly-placed controls and precision steering ensure effortless handling and manoeuvrability.
- ★ 'Underfloor' engines providing a clear floor area afford maximum cab comfort with heat insulation and silence.
- ★ New Commer medium diesel engine, a six-cylinder o.h.v. 'underfloor' unit with an unequalled power/weight ratio, develops 87 b.h.p.
- ★ Chrome plated cylinder liners give a phenomenal bore life.
- ★ Outstanding economy is combined with smoothness, ample power, and easy starting.
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- ★ Two magnificent engines of exceptional longevity and reliability.

✳ ***NEW CAB ALSO AVAILABLE ON 7-12 TONNERS***

ROOTES PRODUCTS — BUILT STRONGER TO LAST LONGER!

COMMER CARS LIMITED LUTON BEDS. EXPORT DIVISION: ROOTES LTD. DEVONSHIRE HOUSE PICCADILLY LONDON W.1

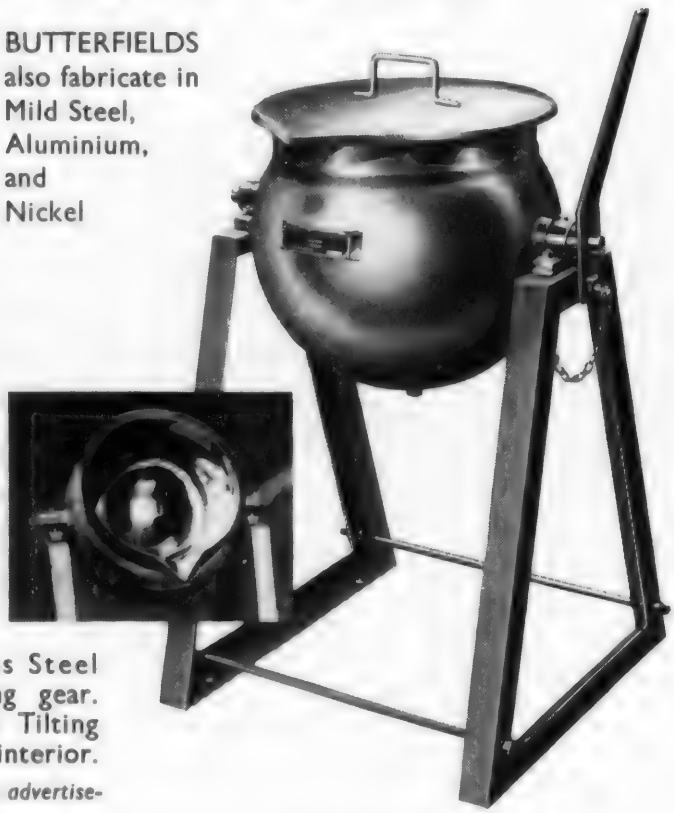
Widely commended for sound service in the storage and processing of liquid foodstuffs

Butterfield

STAINLESS STEEL EQUIPMENT

To meet the exact requirements of the Food Industry, as to hygiene and the elimination of corrosion. Butterfields produce (to specification) large numbers of Stainless Steel Tanks, Vats, Vacuum and Pressure Vessels, Boiling Pans, Tilting Pans, etc.

BUTTERFIELDS also fabricate in Mild Steel, Aluminium, and Nickel



Illustrated above: a Stainless Steel Syrup Mixing Pan with stirring gear. Right: 5 gallon Stainless Steel Tilting Pan. Inset shows highly polished interior.

Please mark all enquiries relating to this advertisement as follows F/M/10

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The most efficient machines for the packaging of

BUTTER, MARGARINE
CHEESE
ICE CREAM

and all kinds of Food Products.

Automatic Moulding and Wrapping Machines for Butter, Margarine, Lard, etc. Various types for production from 30 to 120 packets per minute.

SPECIAL AUTOMATIC MACHINES FOR THE FOOD TRADE

KUSTNER

DAIRY SHOW
LONDON
STAND NO. 64
GRAND HALL

KUSTNER BROTHERS & CO., LTD., ENGINEERS, GENEVA, (SWITZERLAND)

Number 2 October 1958

Coconut Oil
(No. 2)

LODERS and NUCOLINE LTD.
INFORMATION BULLETIN

CHARACTERISTICS

The average oil content of copra is 66·5 per cent, and, dependent upon its qualities, yields a white to brownish-yellow fat. This fat is somewhat crystalline in appearance and possesses a marked degree of brittleness at low temperatures, but as its melting point is 25° C., becomes soft and almost liquid at normal summer temperatures. Before refining the fat has a flavour which can vary from fresh coconut to a disagreeably harsh taste, but after refining the oil is odourless and tasteless, of a good white appearance and stable.

CHEMICAL NATURE

Coconut Oil is distinguished chemically from many other fats by the presence of large quantities of glycerides of lower saturated fatty acids, e.g. Lauric and Myristic Acids, as well as small quantities of the short chain volatile acids—Caproic, Caprylic and Capric. Unsaturated fatty acids are present in small amounts only, thus giving excellent stability, particularly against the formation of oxidative rancidity.

The complete fatty acid composition of Coconut Oil is given below (average values per cent).

Caproic Acid	0·5
Caprylic Acid	7·4
Capric Acid	7·2
Lauric Acid	48·0
Myristic Acid	17·5
Palmitic Acid	9·0
Stearic Acid	2·1
Oleic Acid	5·7
Linoleic Acid	2·6

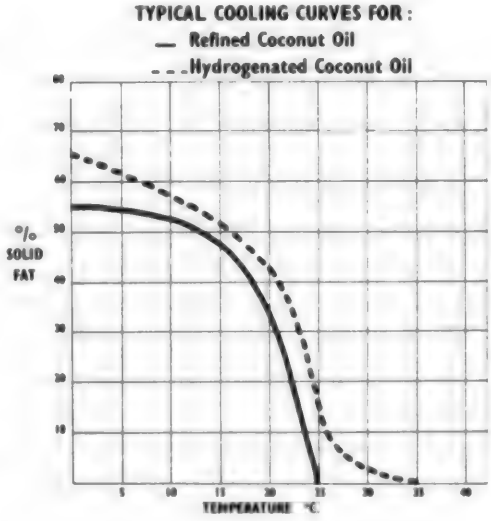
The rather unusual fatty acid composition of Coconut Oil accounts for its high saponification value, high Reichert and Polenske values, and low iodine value.

These fatty acids are combined in Coconut Oil to give different triglycerides with the Lauric and Myristic Acid triglycerides predominating. These particular triglycerides are present in large quantity and account for the fact that Coconut Oil does not soften gradually with increasing temperatures, but passes rapidly from a hard solid to a liquid state within a range of a few degrees.

The small content of glycerides of unsaturated fatty acids is sufficient for hydrogenation to be applied and the sharp melting Coconut Oil may be hardened to a product of longer plastic range and higher melting point.

COCONUT WAX

Coconut Oil contains a very small amount of natural waxes which sometimes give rise to a turbidity in the oil when stored liquid at temperatures below about 120° F. The main constituent of these waxes is an ester of a monohydric alcohol and a fatty acid, both of high molecular weight.



LN 44-8056-100

FOOD MANUFACTURE

Vol. XXXIII, No. 10 October 1, 1958

Food college appeal

THE governors of the National College of Food Technology have launched an appeal for £50,000 towards the cost of the new college buildings to be erected at Weybridge, Surrey. The Ministry of Education is to contribute about £300,000 towards the estimated total cost of £350,000.

The appeal is directed to the food industry as a whole, and many firms have received copies of a letter by the chairman of the board of governors, Sir Frank Shires, who launched the appeal. In it, Sir Frank points out that the future security and development of the British food industry in an increasingly competitive world depends on the quality and quantity of liberally-educated young men and women trained in the basic sciences and their practical application. The new college will accommodate nearly three times as many students as can be accepted at present, and will therefore do much to ensure that the supply of adequately-trained food technologists keeps pace with the industry's increasing demands.

When it is considered that the food industry itself will be the chief beneficiary from the colleges expanded facilities, the proportion of the costs which it is called upon to meet, amounting as it does to only about one-seventh of the total, is extremely modest, and it is hoped that donations will be generous. The new college (which was described more fully in the May issue of FOOD MANUFACTURE) will be equipped with up-to-date plant modified for instructional use in connection with various modern food processes such as quick-freezing, dehydration and canning, and will turn out technologists much more familiar with a variety of food processes than are usually available from other sources. This will be particularly valuable to small firms not able to call on the services of a wide range of technically-qualified staff, and in fact many of the students leaving the college are already finding employment with firms of this type. The governors of the college therefore hope that the smaller firms as well as the larger will feel able to respond to the appeal.

Two donations of £1,500 and one of £1,000 have already been promised, and many other donations, ranging from £5 upwards, have also been received. The governors point out that donations may be treated as a business expense when computing liability for tax.

Antioxidants in food

REGULATIONS have at last come into force permitting the use in England and Wales of specific antioxidants in certain classes of food. These are embodied in the Antioxidants in Food Regulations, 1958 (S.I. 1958 No. 1454). Similar regulations applying to Scotland are expected to be issued shortly.

These long-awaited regulations bring Britain into line with other countries permitting the use of antioxidants, and should prove of great value to processors of fats and fat-containing foods. Briefly, they permit the addition to all anhydrous edible oils and fats of 100 parts per million of either propyl, octyl or dodecyl (lauryl) gallate, or any mixture thereof, plus 200 p.p.m. of butylated hydroxyanisole (B.H.A.) or butylated hydroxytoluene (B.H.T.), or a mixture of these compounds. Butter for manufacturing purposes may contain 80 p.p.m. of the gallates plus 160 p.p.m. B.H.A. and/or B.H.T., and essential oils may contain 1,000 p.p.m. of the gallates plus 1,000 p.p.m. of the butylated compounds. Food products containing any of these specified foods as ingredients may contain the permitted antioxidants in proportion to the amount of specified food they contain (*i.e.*, a food containing 25% of added anhydrous fat may contain 25 p.p.m. of the gallates plus 50 p.p.m. of the butylated antioxidants). In addition, any article of food which contains milk fat by virtue of the addition of any dairy product may contain these antioxidants in proportion to the amount of anhydrous fat equivalent to the milk fat they contain.

The requirements for labelling, as they stand, are likely to give rise to some confusion. All foods to which an antioxidant has been added, directly or as part of one of the ingredients, must be clearly labelled with the nature and maximum amount of the antioxidant present. Excepted from this clause, however, are foods for sale "either by retail or prepacked." These will be governed as before by the existing labelling regulations. What is not clear is whether these

labelling regulations call for a declaration of the name of the antioxidants (propyl gallate, butylated hydroxyanisole, etc.), or whether the generic term "antioxidant" may be used.

The regulations will be welcomed by all but the most extreme of the "pure food" advocates. They are extremely conservative, all substances to which the smallest suspicion of toxicity attaches having been rigidly excluded, and manufacturers abiding by them will not be in danger of transgressing the regulations of most other food-controlling countries to which they might export their products.

It has been argued that "best practice" renders the use of antioxidants unnecessary. Under ideal conditions of preparation of raw materials, of manufacture, and of distribution, this may well be so; but the manufacturer, particularly the exporter, often controls only the second of these factors; and the fact remains that enormous losses occur annually from the oxidative rancidification of fats and fat-containing foods—losses which the use of antioxidants can do much to abate. In any case, there is little danger of the antioxidants encouraging bad practice, since they can do nothing to mask deterioration, or indeed arrest it once it has firmly begun.

Moreover, it is not merely the economic aspect which is important. Elsewhere in this journal are references to the possible toxicity of oxidised fats, and to our growing realisation of the importance of the highly unsaturated fatty acids as essential food factors. Recent mention has also been made of the importance of fat-soluble vitamins, particularly vitamin E. By inhibiting the formation of possibly-toxic oxidation products and the destruction of the easily-oxidised dietary principles, the permitted antioxidants should play a useful part in improving the "hidden quality" of many of our foods.

Co-operation in food production

Of all the questions vexing the Middle East today, the one which above all precludes the reaching of a lasting *detente* is the racial enmity and profound political distrust existing between Israel and her Arab neighbours. Judging from the general news, in fact, one is led to believe that the idea of Jew and Arab working together in any kind of amity, inside or outside Israel, is a "pipe dream" of the highest order.

Yet impressions of this nature can often prove false, and it is encouraging to hear from an Israeli correspondent of a co-operative scheme for food production, jointly owned by Jewish and Arab investors, which has been set up in the "Little Triangle" area near Jerusalem. Known as the Baka Preserves Works, Ltd., this enterprise, the first of its kind in the country, has a capital of I£50,000, and an ultimate total investment of I£600,000 is planned. About 70% of the capital was granted as a loan from the Ministry of Commerce and Industry at 7% interest over a period of 12 years.

The factory will process vegetables and citrus and other fruits. About 250 Arab and Jewish workers and technical staff will be employed, and it is expected that the factory will absorb the whole of the produce of the Arabs in the area. When it reaches full production, the output of the new factory, of which at least 60% will be exported, will be worth I£1½ million per year.

It is heartening to hear from a country so beset by internal and external racial problems that food manufacturers are taking the lead in showing that healthy commercial and industrial activity can break down barriers which formerly seemed insurmountable.

Bacon standards

In a recent issue (Food Manufacture, **33**, 221, June, 1958), we drew attention in these columns to criticisms made by certain farmers that British bacon curers were not maintaining in the bacon the standard demanded of the farmers in the pigs. The Pig Industry Development Authority has now been in consultation with the Bacon Curers' Federation about the desirability of drawing up a code of practice for the guidance of British Wiltshire bacon curers. This approach has met with a favourable response, and the Federation has appointed representatives to serve on a joint Committee with P.I.D.A. to draw up a code. The Committee consists of Mr. F. D. Lawson, and Mr. R. E. Blanning, representing the British Bacon Curers' Federation, and Mr. E. E. Marsh, Mr. James Sainsbury, and Lord Trenchard from P.I.D.A. The job has already been begun by a study of a code drafted by the Bacon Marketing Board, together with the regulations operating in other producing countries.

Announcing this development, Lieut. General Sir Archibald Nye, chairman of P.I.D.A., admitted that many producers felt that while much attention had been given to the need to produce a more consistent pig, less attention had been focussed on the processing of the pig into bacon. He was emphatic, however, that P.I.D.A. would not be associated with any general condemnation of the standard of curing in this country. On the contrary, they took the view that it was for the most part good, and that it was no service to the industry as a whole, including the producers, to indulge in general criticism of it. They thought, moreover, that it needed to be understood that even with the best practice under the most rigorous control, there must be risk of some variation in the end product. This applied to imported bacon as well as to that produced in this country.

Nonetheless, he said, the Authority was of the opinion that some samples of bacon marketed did vary more than they should from the standard attainable under the best practice.

It is contemplated that the code of practice will in the first place be brought to the attention of all British Wiltshire bacon curers by P.I.D.A., with a view to its adoption on a voluntary basis. Sir Archibald said he was aware that many people felt that a scheme for grading and marking British bacon was urgently needed. The Authority had it in mind that this could be a first step towards such a system.

Sir Archibald also mentioned the question of an advertising campaign for British bacon. He recognised that a considerable body of opinion in the industry felt that an immediate start should be made on such a campaign, but felt that no responsible body could possibly recommend such an expensive step without first being reasonably sure of commensurate advantages. The Authority was actively examining the possibility, however, with its professional advisers, of promoting the advertising not only of bacon but also of other pork products.

Fighting for fish

It is profoundly to be hoped that by the time this journal appears the Iceland fishing dispute has not taken a more serious turn. At the time of going to press it threatens to become somewhat farcical, with trawler crews and their would-be arrestors bombarding each other with fish—the very commodity at stake.

It is difficult to see, however, how a more serious turn can be avoided. It is one thing for trawlers to fish in convoy, escorted by naval vessels, for a relatively short time during a season of good weather. It will be quite another for them to attempt to do it successfully when the autumn and winter gales arrive. As the stability both of ships and tempers become affected by higher seas, it is hard to see how more unpleasant incidents can long be avoided.

As with all disputes of this type, there seems to be a certain amount of justice on either side. Legally, we are clearly in the right, for the areas under dispute remain to us the high seas, and will continue to do so in the absence of an agreed settlement. With many of the former North Sea and middle-distance fishing grounds becoming increasingly unproductive, our fishing fleets have been extensively re-equipped with long-distance boats, and the Icelandic fishing grounds represent one of their most important sources of catch. On the other hand, one must be allowed a certain sympathy with the Icelandic people, who rightly or wrongly see their one and only source of national wealth threatened with the fate which has befallen the once-rich banks of the North Sea.

It is to be hoped that some agreed solution will not be long delayed, for the loss of the Iceland grounds would be a sad blow to the British fishing industry, and to the promising growth of the quick-frozen fish trade. The latter already shows some promise of putting fish, which has perhaps never featured in the national diet to quite the extent that might be expected in such a sea-girt nation, nearer the front rank of our foods. It would be a great pity to see the industry nipped in the bud at this stage by a gross diminution in our fish supplies.

More historic packs

Another interesting "opening ceremony" took place recently at the laboratories of the British Food Manufacturing Industries Research Association, where before a battery of television and press cameras, Mr. H. L. Shipp, chief bacteriologist of the Association, opened two more food packs of considerable historical interest. One was a tin of emergency ration issued to a British officer during the Boer War, and die-stamped "December 1899"; the other was a tin issued to a soldier serving in the Waziristan campaign on the North-West Frontier during the first world war. This tin was die-stamped "May 1915."

The Boer-War tin was divided into two halves, one containing concentrated beef and the other cocoa paste. Likely processors were said to include the firms of Crosse and Blackwell, Maconochie Bros., or W. S. Shuttleworth, all of whom are members of the Research Association. The tin itself was probably manufactured, according to the Association, by John Feaver, Ltd., who are also members. According to the label on the pack, it was calculated to maintain strength for 36 hrs.

The North West Frontier Pack had been subjected, according to its owner, to temperatures of 138°F. and more, and had then been kept in his house for 40 years amongst his war relics. It had lost its label, so that up to the time of opening its contents remained something of a mystery. Evidence had been collected, however, which pointed strongly to the fact that the contents had been processed by Bovril, Ltd., and a replica, complete with label, was on view.

A large audience of Government officials, representatives of the interested firms, and members of the Press were present for the opening of the cans. After collecting a sample of gas in a vacuum chamber from the meat-containing half of the composite pack, Mr. Shipp removed the sealing band from the centre of the pack under a sterile hood. This revealed two small cans with pry-off lids, which were sampled aseptically for examination of their bacteriological quality.

The contents of the cans were then tasted by in-

terested members of the audience, both in the raw state and after preparation according to the instructions on the labels. (This consisted essentially of cooking them up in hot water). Sufficient time was not available for a full cooking of the meat pack, but some idea could be formed of its wholesomeness. The second can proved to be a composite mixture of cocoa and other dried but unidentifiable ingredients.

In the view of Dr. F. H. Banfield, Director of Research of the Association, the contents of the packs were still completely edible, if perhaps not very appetising. As he pointed out, the low moisture-content of the packs precluded the possibility of any dangerous bacterial spoilage having occurred.

The packs are now being subjected to an exhaustive analysis; which should provide useful information about the nature and extent of the reactions which have occurred in the foods, and between the foods and their containers, during their long life.

Less to pay and more to read

THANKS to a steady increase in circulation figures, it has now been found possible to reduce the price of FOOD MANUFACTURE, which will in future cost only £2 per annum. At the same time it is planned to increase the number of editorial pages. Reductions amounting to one third or more have also been made in the subscription rates of 11 of the other 14 journals published by the Leonard Hill Technical Group. These changes have been made to encourage the widest possible dissemination of technical information, an objective of ever-increasing importance.

As many readers may not be fully aware of the extent to which Leonard Hill journals cover the scientific and industrial fields, advantage might be taken of this opportunity to draw attention to some of the companion journals to FOOD MANUFACTURE. Perhaps the most closely related are *World Crops* and *Dairy Engineering*, both dealing with important aspects of food production. *Automation Progress* also covers a field of increasing importance to food manufacturers, whilst the ever-present problem of corrosion, on which we turn the spotlight in this issue, is fully discussed month by month in *Corrosion Technology*. Many aspects of the chemical industry are also covered, on the pharmaceutical side by *Manufacturing Chemist* and on the heavy chemicals side by *Chemical and Process Engineering*, and *Atomics and Nuclear Energy* contains articles of interest to scientists and technicians in this vital new field of industrial activity.

Covering as it does only half the journals of the Leonard Hill Technical Group, this brief review none the less gives some idea of the diversity of subjects covered. We hope that technically-minded readers everywhere will take advantage of the recent reduction in prices not only to pursue their interest in food manufacture, but to keep abreast of scientific developments in the many related fields.

And everywhere that Mary went. . .

IF anyone discovers a new class of drugs of value in human medicine, it is rapidly becoming odds-on that someone will sooner or later advocate its use as a growth-promoting principle in animal feeds. It happened with œstrogens, it happened with antibiotics. Now it has happened with tranquillisers. Granted the effectiveness of tranquillisers in their specified role—which is not universally conceded by medical men in this country, at least so far as many of the compounds advocated goes—it is quite reasonable to suppose that they would be of equal value to the veterinary profession, in calming sick animals and pacifying dangerous ones. Equally, one could anticipate the suggestion that they might be useful during the transportation of stock, especially when this occurs just prior to slaughter. Reports have now come from America, however, of significant increases in the growth rates of lambs and cattle fed with supplements of certain tranquillisers—and that at a dietary level too low to cause any signs of sedation.

Reporting experiments carried out at the Pfizer Agricultural Research Centre and several State Colleges, Mr. H. G. Luther, a Pfizer representative, said that when fed supplements of 1·2 to 2·0 g. of Trans-Q (one of the company's proprietary tranquillisers), per ton of feed, wether lambs showed an increased growth of over 21%. Feed efficiency was increased by 8%, carcase grade by +0·2, and financial return by $1·36 per animal. Both controls and test animals had already been stimulated to superior performance by stilbœstrol implants and terramycin supplements, but a still further increase in performance was caused by the tranquilliser. Qualitatively similar results were reported for beef cattle. Prolonged feeding tests with relatively massive doses of the tranquilliser showed no toxic effects.

Discussing the possible mechanism of this growth-promoting effect, Mr. Luther said that the apparent physical activity of the animals was not reduced. He suggested that small doses of tranquillising drugs might exert a protective effect against environmental stress which is not reflected in the animals' gross behaviour, but which might conceivably, through the nervous system, have a beneficial effect on the organs of digestion and assimilation.

So now, their performance improved by œstrogens, antibiotics and tranquillisers, and protected from the cares even of animal life, our stock can happily eat and grow fat, leaving us to worry, tranquillisers notwithstanding, whether that fat is sending us to our graves via our arteries.

Milk and Chocolate

The Heart and Soul of Nestle's—1

Nestlé's milk products are produced and consumed all over the world. In Part 1 of this article we describe a typical Nestlé condensery, and follow through some of the milk to its conversion into the firm's popular milk chocolate drink. Part 2 will describe the production of the chocolate and confectionery for which the Company is equally famous.

THE Nestlé Company can now look back almost 100 years to its first beginnings. In the year 1866, two notable events occurred which were to lead eventually to the formation of this vast organisation, now ranked fourth in size amongst the world's food producing concerns.

The first of these was the formation by the United States Consul in Zürich of the Anglo-Swiss Condensed Milk Company, and the building of a small condensery in the Swiss village of Cham. The consistent purity and quality of the products of this company soon recommended themselves to the public and the medical profession, and the demand for the company's products, particularly for feeding babies and children, grew rapidly. By 1900 there were already 14 Anglo-Swiss condenseries, including four in America.

The second of these events occurring in 1866 was a discovery by the chemist Henri Nestlé, who had been experimenting in the Swiss town of Vevey. In that year, Nestlé produced a new formulation for a balanced infant food, consisting of milk, sugar and malted wheat flour, intended to complement milk in early feeding and to serve as a follow-on diet. By 1878 his company was producing both this new Nestlé's Milk Food and Nestlé's Condensed Milk.

Nestlé's first manufacturing plant was adjacent to the premises occupied by Daniel Peter, a chocolate manufacturer, and it was in 1905 that the two men developed "milk chocolate."

In 1905 the rival companies joined forces, the combined company taking the name of Henri Nestlé. Its development has since proceeded rapidly, until it has now spread to all five continents. There

The beginning of the line. Milk is received in churns, which are weighed and inspected individually before the milk is bulked for use.

are now 9 Nestlé's milk factories in England, Scotland and Northern Ireland, 30 in continental Europe, 12 in the U.S.A., 10 in South America, 9 in South Africa, and 5 in Australia and New Zealand, and Nestlé's condensed milk is sold everywhere from the largest food emporia to the tiniest village trading posts throughout the world.

Production in Britain

The condenseries operated by Nestlé's in the United Kingdom naturally vary somewhat one from another in size, design and capacity, but the essential details of production are standardised throughout the company, and the operations of one plant serve to illustrate the workings of all. For the purpose of this article, FOOD MANUFACTURE visited the company's condensery at Chippenham, in Wiltshire. This condensery produces full cream sweetened condensed milk and skimmed sweetened condensed milk. Cream is naturally produced in the preparation of the skimmed milk, but this is processed elsewhere.

The factory draws its local supplies from about 260 producers, mainly in north Wiltshire and south Gloucestershire. The milk is delivered principally in churns. In the summer the intake is supplemented by the transfers of bulked milk from other centres in large road tankers. During the summer "flush" season up to 30,000 gal. per day are received at the condensery.

On its arrival at the receiving dock, the milk is first examined by the dock foreman, who smells and tastes the milk from each churn. If he is satisfied with the quality of the milk, this is accepted and weighed; if he has any doubts the milk is held pending the examination of samples by the laboratory. In addition, routine laboratory tests for composition and bacteriological quality are carried out

The milk is evaporated in dished-bottomed, stainless-steel vacuum pans without calandria. Each pan is heated by six stainless-steel steam coils in the bottom.

once a month on samples of milk from each supplier.

The accepted milk is next weighed in a double-compartment scale having two weighing bowls attached to a common beam. As one bowl is being emptied the other can be filled, and this naturally speeds up the operation considerably. The milk passes from the weighing bowls in a small open tank, from which it is pumped continuously to large enclosed holding tanks on the floor above.

The empty churns are returned through a washer, where they are cleaned with hot detergent solution, rinsed with hot water, steam sterilised and finally dried with hot air before return to the farms.

The four holding tanks, which like the other equipment used are of stainless steel, each has a capacity of 3,000 gal. As the milk enters the tanks an average sample is automatically collected, which is analysed in the laboratory for fat content and solids-not-fat. On the basis of this analysis, the contents of each tank are adjusted by the addition of cream or skim milk to a standard ratio of fat to non-fat solids. Any such necessary additions are made through ports at the top of the tanks, the milk then being thoroughly mixed by means of horizontal agitators until the added ingredients have been evenly incorporated with the bulk of the milk.

Pasteurisation

The milk is pumped from the tanks under pressure by means of centrifugal pumps through tubular pasteurisers, consisting of a series of jacketed tubes, interconnected at the ends. Hot water is circulated counterwise in the outer jackets, so that the milk makes several passes against the heating element. The temperature of the water and the rate of flow are adjusted so that the milk leaves the equipment at the desired temperature.

The heated milk is passed from the pasteuriser to holding tanks, where it is held at an elevated temperature for a pre-determined time, prior to being drawn into the evaporators.

Evaporation

The evaporators consist of vertical cylinders with dished ends, each containing six stainless-steel steam coils in the bottom. The lower sides and bottom of the evaporators are also steam jacketed. Vacuum is drawn by a wet vacuum pump, which is connected to the entrainment pipe.

Milk enters the evaporator through a small pipe leading into the pans about two-thirds of the way up, and sugar solution is pumped in at the same point. The evaporators work at between 50° and 55°C., under a vacuum of 29 in., steam at a pressure of about 1½ atmospheres being used to maintain this temperature. The milk circulates rapidly within the pans, rising in the centre and descending on the outside.

The milk is handled batch-wise in the evaporation process, batches being "struck" when the required concentration has been reached—this being indicated by total solids content as determined by refractometer. The condensed milk is pumped into an agitating tank which is cooled by water sprays, where its temperature is reduced to approach that of the atmosphere. From here it is

The condensed milk is held after cooling in large stainless-steel tanks, from which it is drawn to the head-tanks of the filling machines.

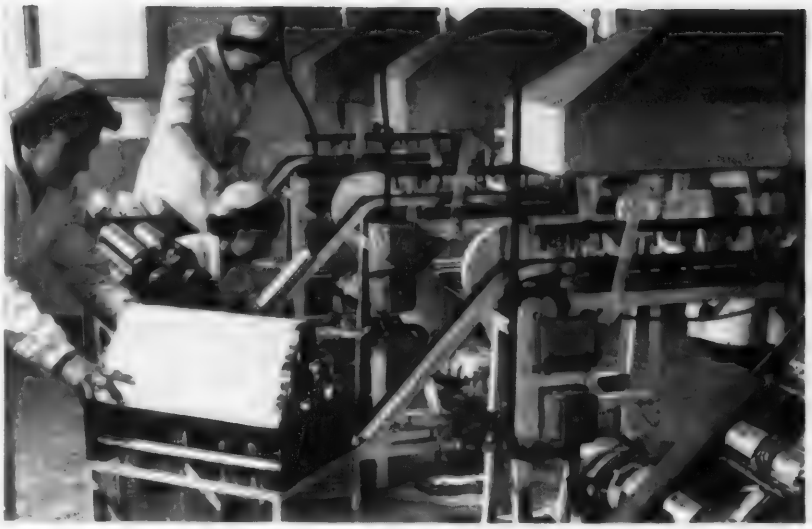
pumped to holding tanks of about 3,000 gal. capacity, where it is held until required for filling. From these it passes by gravity to the head-tanks of the filling machines on the floor below.

Addition of sugar

The amount of sugar added to each batch of milk is calculated on the basis of the weight and analytical figures for that batch, sugar being added in proportion to the amount of butterfat present. The sugar is added as a syrup, which is prepared by emptying the requisite amount from 2 cwt. sacks into a chute feeding a melting pan. Here it is mixed with sufficient water to make up a solution of about 60% concentration, which is boiled for 10 min. before being filtered and drawn into the vacuum pan.

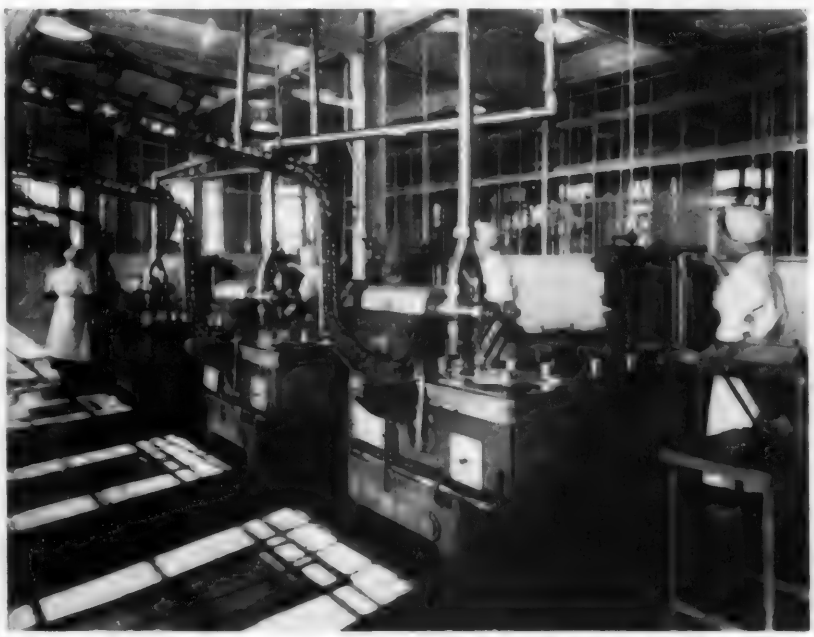
Filling

It is the normal practice at all Nestlé factories for the cans into which the milk is filled to be fabricated on the spot. The Chippenham factory has a single high speed can line capable of producing 240 can bodies per minute, the necessary ends being supplied from its neighbouring factory. Sizes vary somewhat with the product, two of the most common being 13½ oz., used for sweetened condensed skim milk, and 14 oz. used for sweetened condensed full-cream milk. As condensed milk is filled cold and receives no heat-treatment after filling, special care has to be taken to ensure the complete sterility of the containers. The cans entering the filling room therefore pass over gas jets, which sterilise the inside of the cans. The lids are passed over jets in a similar manner on their way to the seamers; no lining compound is used in these ends. The fillers are positive-displacement volumetric machines, some having horizontal measuring cylinders and others having these cylinders set in a vertical position. Each of the horizontal machines in use has two double filling heads, and is capable of filling 94 cans per min.; the vertical machines have eight filling heads and operate at a speed of 150 cans per min.



The sterilisation of can covers under gas jets, to be seen on the right of the picture, is an important step in the correct preservation of the product.

The filled and closed cans are passed on to a steel conveyor belt, where they are inspected before passing to an automatic labelling and cartoning unit. The cartons are also glued and sealed by automatic equipment, from which they pass between a double conveyor belt to the warehouse. Here they are stacked by hand on to pallets, which are handled within the warehouse by forklift trucks.



A battery of positive-displacement volumetric fillers, which are used for filling the condensed milk into cans.

Cleaning and quality control

The fact that the product receives no further processing after filling means that special care has also to be taken in the maintenance of scrupulously sanitary conditions within the plant, and an elaborate cleaning procedure is in operation. This involves the stripping down of all pipelines at the end of each day's production, the individual lengths of piping being cleaned with detergents and hot water on a brushing machine, which allows a revolving brush to

be passed horizontally through the pipes. The pipelines are sterilised with steam after re-assembly, and again before production commences on the following day. Tanks and evaporators are also cleaned and sterilised before and after each day's production.

Quality control, in addition to the laboratory tests already mentioned, includes a bacteriological check on each batch of condensed milk produced, as well as spot tests on cans, can covers, and water supplies.

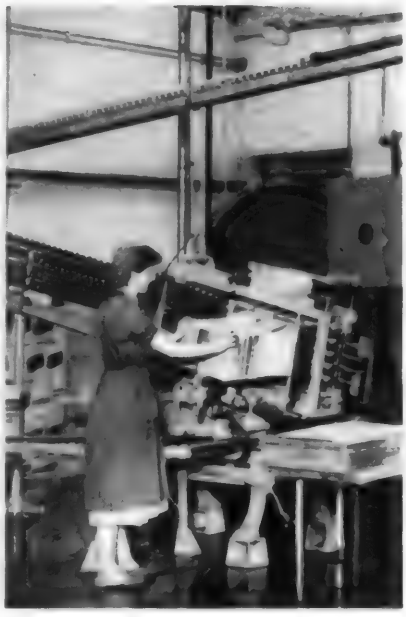
Gerber tests for fat content, specific gravity, determination for total solids and reazurin reduction tests to determine hygiene quality are also performed on the incoming milk. A check is also kept on the sources of supply, and inspectors regularly visit every farm from which milk is drawn to ensure that the cows, the milking equipment, and the general standards of sanitation conform to the standards laid down by the company.

Production of Milo

The production of Milo, Nestlé's chocolate-flavoured milk beverage, takes place in the company's factory at Carlisle in Cumberland. The drink consists essentially of concentrated milk, malt extract, sugar and cocoa mixed with yeast extract, minerals and vitamins. The pasty mass resulting from the mixing of these ingredients is dried in a vacuum band drier, and the dried powder is then ground to the required size and packed in tins for distribution. The preparation of the cocoa naturally constitutes a considerable portion of this process, and this operation will be described in Part 2 of this article, which deals with Nestlé's chocolate products.

SUPPLIERS OF EQUIPMENT

Filling machines: *Albro Fillers and Engineering Co., Ltd.*
Heat exchangers, pumps, homogenisers, etc.: *A.P.V. Co., Ltd.*
Weighing machines: *W. and T. Avery, Ltd.*
Labelling and packing machinery: *Adams Powel Equipment, Ltd.*
S.S. tanks and equipment: *Burnett and Rolfe, Ltd.*
Evaporators: *Blaw Knox, Ltd.*
Fork lift trucks: *Coventry Climax Engines, Ltd.*



The end of the line. The filled cans are loaded into cartons, ready for dispatch.

Refrigeration plant: *J. and E. Hall, Ltd.*
Pumps: *R. Morton and Co., Ltd.*
Stainless steel tube: *Talbot Stead Tube Co., Ltd.; Accles and Pollock, Ltd.*
Dock mechanisation and churn washers: *Wright Hargreaves, Ltd.*
Vacuum pumps and drying ovens: *G. Scott and Son (London), Ltd.*

Fruit and Vegetable Products

A 4th edition has now been published of Professor Cruess's well-known book on fruit and vegetable processing.* Designed as a textbook for college lecture courses, the book is also a useful reference manual for manufacturers of canned and frozen foods, preserves and fruit juices. The author devotes equal attention to the fundamental principles underlying various processes and to the practical aspects of the processes themselves, describing why certain steps are taken as well as how.

New material in this 4th edition includes: aseptic canning, steam-flow closure of cans, "liquid sugar," new products from surplus fruits, sterilisation by irradiation, H.T.S.T. sterilisation, low-temperature vacuum concentration of fruit juices, and the re-use of water in canneries. Chapters on wine-making and on olive and coconut oils have been dropped.

Prof. Cruess, who has contributed several articles to FOOD MANUFACTURE, is recognised as a world authority on fruit and vegetable products, and with food processing techniques making rapid advances in many directions, a new edition of his book is most welcome.

* *Commercial Fruit and Vegetable Products.* By W. V. Cruess. McGraw-Hill, London. 4th ed., 1958. Pp. vii+884. Illus. 116s. 6d. net.

Chemistry of Fats

A book has recently appeared* in which an attempt is made to bridge the gap between the long and advanced monographs dealing with lipid chemistry and the somewhat inadequate treatment given to this subject in most textbooks of organic chemistry. It is hoped that it will therefore be useful both to the students and teachers of Universities and Technical Colleges, and also to industrial chemists who have not had specialised training in this branch of chemistry.

The first chapter discusses the fatty acids as the most important structural units of the fats, and is followed by an account of the chemical nature of the latter. A short chapter is then devoted to physical aspects, followed by a longer report of the chemical properties of fats and their component acids. Finally, there are two short chapters on some biochemical and technical aspects of the subject.

As Professor Hilditch says of the book in his foreword: "Whilst it gives a very clear and straightforward account of fats suited to the needs of the general body of students, Dr. Gunstone's book goes just far enough into further detail . . . for those who purpose to make fats their subsequent interest, either in industry or in more specialised biochemical or academic research.

* *An Introduction to the Chemistry of Fats and Fatty Acids.* By F. D. Gunstone. Chapman and Hall, London. 1958. Pp. x+161. 32s. net.

CORROSION in the Food Industry

By J. W. Selby, B.Sc., A.R.I.C.*

It is not possible in an article of this size to deal with all aspects of the corrosion problems encountered in the handling and manufacture of food. Accordingly it is proposed to discuss only a few, namely, those special aspects, which appear to make the food industry unique in the corrosion technologist's experience.

INSOFAR as it is possible to generalise with the wide range of substances known collectively as food, the principal corrosive constituents likely to be encountered are: atmospheric oxygen; organic acids such as malic, citric, lactic or acetic; chlorides, mainly sodium chloride; a small amount of labile sulphur, to be found in the sulphide linkages of many proteins; and sometimes sulphur dioxide, which may be used as a food preservative. This list is by no means exhaustive and it is offset by a somewhat similar list of substances which may have inhibitory effects on corrosion. These are not so well-defined as the corrosive agents, but they include members of such classes as the proteins, the carbohydrates and the fats. Thus many foods are rather complex combinations whose exact corrosion characteristics are not easy to predict except after long and careful experiments with metal test-pieces under actual factory conditions. Broadly speaking, however, they fall within one of four groups: the acid-chloride group, which includes pickles and sauces; the acid group which includes most fruit products; the neutral chloride group which includes many meat and fish products, such as bacon, ham, meat and fish paste, etc.; and a neutral and relatively inert group which includes fats and various cereal products.

Quite apart from considerations relating to the expected life of a piece of equipment, the food manufacturer is deeply concerned with corrosion from the contamination angle.

Toxicity

Firstly, there is the question of toxicity, which is a very difficult problem and one which is at present being most carefully considered by the Food Standards Committee of the Ministry of Food, and its Metallic Contamination Sub-Committee. These Committees have already drawn up recommendations for limiting by Statute the amounts of arsenic, lead, copper and zinc allowed in various foods and have proposed a maximum acceptable concentration for tin in canned foods it is likely that they will proceed to deal with other metals in due course. In reaching their decisions, they appear to accept the view that minute traces of many metals are essential to the welfare of the human organism and, in certain cases, where a metal is shown to occur naturally in a food in fairly large amounts, *e.g.* copper in shellfish, provision has been made for the metal to be allowed in excess of the generally prescribed limit. Low limits are naturally set for metals which are known to have serious toxic hazards, the proposed figure for lead varying from 0·5 parts per million for concentrated soft drinks, to 20 p.p.m. for colouring matters used in food; and that for arsenic, from 0·1 p.p.m. for beverages ready-to-drink to 5 p.p.m. for natural colouring matters, herbs, spices, etc. It will be seen that in proposing these limits, some regard is had for the amount of the particular food or food constituent which is normally likely to be ingested by an individual.

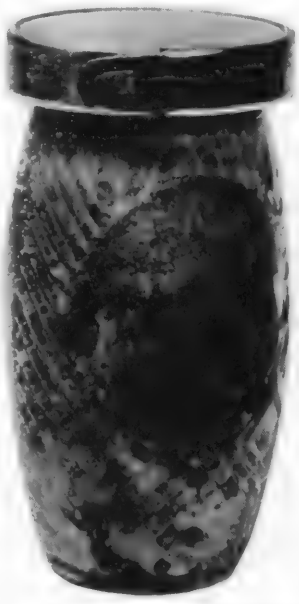


Fig. 1. Copper sulphide staining in meat paste.

For metals such as zinc and copper, which are toxic to a lesser extent, the proposed limits are higher, ranging from 5 to 50 p.p.m. for zinc and from 2 to 150 p.p.m. for copper.

It is in dealing with metals such as nickel, tin and aluminium, against which there is little or no positive evidence of toxicity,[1] that the greatest difficulty may arise; and at present, no specific legislation is apparently contemplated in regard to these, although it is suggested that 250 p.p.m. might be accepted as a reasonable limit for the amount of tin in canned food. However, the presence of an excessive amount of any metal or other unusual substance in a food could lead to legal action being taken by the authorities.

Metal ions and flavour

The food manufacturer is concerned secondly with the effects which traces of metal ions may have on the flavour, colour or clarity of his product. The so-called "metallic flavour" is familiar to most people and it may be produced by quite small amounts of a metal such as copper or zinc, particularly in a delicately flavoured food. The presence of

* British Food Manufacturing Industries Research Association.

small amounts of some metals may result in pronounced deterioration of the colour of a foodstuff. Fats, for instance, may be discoloured by the presence of traces of iron or copper. Sulphur-containing foods such as meat show dark stains as a result of contamination with extremely small amounts of metals such as copper, nickel, lead, tin, or iron which react to form black sulphides. Fig. 1 shows a striking example of this. The glass jar was filled with meat paste through a nozzle under pressure, a phosphor bronze cut-off valve behind the nozzle being used to control the flow. Under normal conditions of filling, the period of contact between the paste and the cut-off valve was very brief, and no trouble arose; during a few minutes' hold-up, however, sufficient copper was picked up by the paste which lay in contact with the valve to show marked staining after the jar had been heat-processed. Similarly, a copper rivet in the handle of a knife, touching a piece of meat for a short time, has been known to cause staining to appear on the meat when it was cooked.

The anthocyanin and similar pigments found in some fruits and vegetables are very susceptible to colour changes brought about by traces of heavy metals. Cloudiness in wines is sometimes caused by the presence of small amounts of iron or copper.

Finally, comes the catalytic behaviour of certain metallic ions in promoting oxidative rancidity in fats and in hastening the decomposition of vitamin C. These effects are of particular importance in the dairy and edible fats industries. Copper, once again, is a particularly active catalyst in these reactions.

Choice of metals

It will be clear from the foregoing limitations that the choice of metals for use in making equipment for the food industry is by no means simple and requires a considerable knowledge of the nature of the materials to be handled. Unfortunately, although many food manufacturers have laboratories, these are staffed primarily by analysts, bacteriologists and bio-chemists, who rarely have much knowledge of metallurgy or corrosion technology, so that the responsibility falls rather heavily on the fabricator of equipment to see that suitable alloys are used for a particular purpose. As a further difficulty, pieces of equipment like boiling pans are often used in a food factory much as a saucepan is used in the home, *i.e.* for general purposes; and since food manufacturers, like the housewife, often experiment with new recipes and new products, unexpected corrosion problems can and do arise. Hence the moral for the fabricator is: if there is the slightest doubt about a given alloy withstanding a particular set of conditions choose a more resistant one if possible, since sooner or later, it is probable that the food manufacturer will want to use the same equipment for some other purpose, under conditions which are even more drastic.

Fig. 2. Corrosion of stainless steels in lemon squash concentrate. (*Below*) Plain 18/8 Cr-Ni steels. Note pitting. (*Above*) 18/8/3 Cr-Ni-Mo steels.

In the past, wooden vessels and equipment were used wherever possible for many of the more corrosive processes connected with food manufacture, but since wood is unhygienic and difficult to clean and sterilise satisfactorily, it was only natural that food processors should turn to the stainless steels as a possible answer to their problems. It was soon found that while these materials have serious limitations, not the least of them being their susceptibility to the pitting type of attack by chlorides, especially under acid conditions, on the whole they are a very great boon to food manufacturers.

The 18/8 chromium-nickel steels with additions of molybdenum show the greatest resistance to most acid-chloride conditions and will even give fair service when SO_2 is present also. Many of the early failures of stainless steels in the food industry were due to the use of plain 18/8 steels, when the molybdenum-bearing type was really called for. Fig. 2 shows specimens of the two types after immersion for a period of two months at 37°C. in a lemon squash concentrate containing 30% sucrose, 0·5% sodium chloride, 4% citric acid and 350 p.p.m. SO_2.[2] There is no doubt of the greatly superior resistance of the molybdenum-bearing steels under these conditions, and subsequent experience in the soft drinks industry has confirmed these experimental results. A similar conclusion was reached in regard to pickle and sauce manufacture, where acid-chloride conditions largely prevail. Under less severe conditions, *e.g.* in the meat packing industry, and in the dairy industry, the simple 18/8 steels are usually quite satisfactory.

Stainless steel

The outstanding advantage of the stainless steels when used for food-handling equipment is the exceedingly small amount of contamination of the product which is experienced even under the corrosive conditions mentioned above, which makes them particularly suitable for use where there is prolonged contact between the food and the metal, *e.g.* in cooking vessels, holding tanks, or storage vessels. This property is due to the protective oxide film which is normally present on the

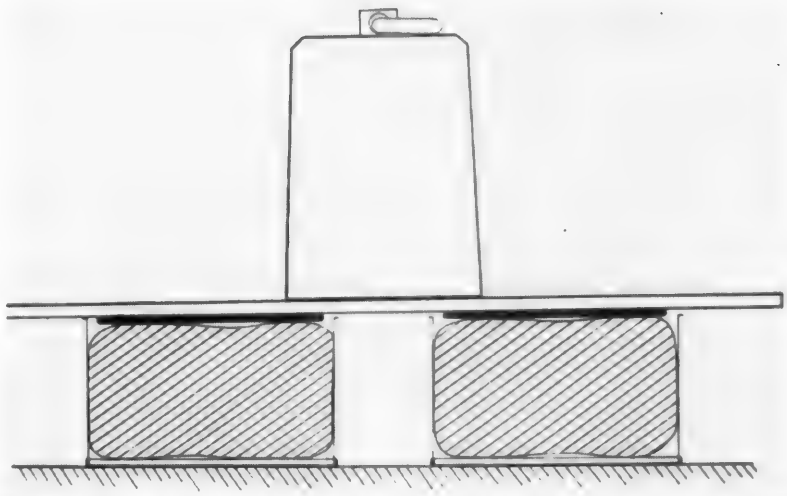


Fig. 3. Diagram illustrating the pressing of tongues in cans. Metallic contact between pressure plate and can at left of diagram caused galvanic action on the tinplate.

surface of these steels. When the film breaks down, it does so only at a few isolated points so that pitting or even perforation of the vessel may then occur, accompanied by only a negligible contamination of the product. Unfortunately the risk of perforation is one which is always present to some extent when working with stainless steel vessels, and this risk coupled with the relatively high cost of stainless equipment sometimes discourages food manufacturers from its use.

Another disadvantage of the stainless steels is their relatively poor heat transfer coefficient, which makes them less suitable for jam- or sugar-boiling pans than copper, which has hitherto largely been used for this purpose. By keeping copper pans scrupulously clean and free from the oxide film which forms when the pans are not in use, it is possible to keep the amount of copper contamination within reasonable limits. Such expedients as hot-tinning the copper pans or lining them with silver have also been used with limited success. Tinning wears away very rapidly and needs to be renewed frequently to be of any use. Silver linings, being thicker, are somewhat more durable, but are liable to blister, especially in vacuum pans. The state of affairs is not entirely satisfactory, and most jam manufacturers would welcome an alloy which combined the corrosion resistance of stainless steel with the heat transfer coefficient of copper. At present the nearest approach to this is probably pure nickel which has been used to some extent, but which still falls considerably short of the ideal and is very expensive.

Nickel and its alloys

Nickel, its copper alloy, Monel, and its chromium-iron alloy, Inconel, are quite widely used in the food industry. They are not subject to pitting as a rule and under mildly acid conditions there is a slow dissolution of metal over the entire exposed surface. The metallic contamination from them is therefore generally higher than from the stainless steels for a similar "useful life" of the equipment. Hence these alloys are most suitable for applications where the period of contact between a given quantity of foodstuff and the metal is fairly short. Some of the chief uses are in pumps, pipelines, valves, pasteurisers, heat-exchangers, filter-cloths, bottle filling-machines, etc., for handling and processing fruit juices, beer, wines, milk, fats and oils. Owing to the fact that nickel readily forms a black sulphide, these alloys have to be used with caution in the meat industry.

Aluminium

The innocuous nature of aluminium and its relative cheapness have led to an extensive use of this metal in the food industries, and Bryan[3] has admirably summarised its uses and limitations. Like stainless steel, it depends for its corrosion resistance on a surface film of oxide which is very susceptible to attack by chlorides, resulting in pitting of the metal. Acids and alkalis also attack the film to a varying extent, so that aluminium can generally only be used under neutral or mildly acid conditions and care is necessary in the choice of detergents for cleansing aluminimum equipment. Subject to these limitations, it gives quite useful service, especially in the dairy and meat packing industries. Having a strongly negative electrode potential, aluminium is liable to undergo severe corrosion if brought into metallic contact with copper, iron, or other more positive metals in the presence of an electrolyte. An example of this, which recently came to the notice of the author, concerned the processing of fruit juices. These were heated in copper vessels, from which they picked up small but appreciable amounts of copper, and were then passed through an aluminium plate filter. Copper was deposited on the aluminium plates, which began to corrode rapidly through the action of the acid juice on the copper-aluminium couple so formed. This example illustrates only too well the type of disaster which can arise in a factory where equipment is acquired piecemeal and used indiscriminately for a variety of purposes. It is, unfortunately, characteristic of some of the smaller manufacturers, particularly of those who attempt to produce a wide range of products on the batch principle.

Tin

Tin has long been established as a safe metal for use in preparing many foods. It is non-toxic and relatively resistant to corrosion, it does not promote rancidity of fats and oils, nor does it

impart unpleasant flavours to foods. Owing to its high cost and softness, however, it is generally used in the form of a thin coating on some other metal such as iron or copper. Such coatings have the disadvantage that they soon wear away and have to be replaced at frequent intervals. Moreover, since the base metal is rarely, if ever, completely covered with tin, the existence of a metallic couple has to be taken into account when considering the corrosion of tin coatings. In spite of these faults, tinned iron equipment has been used to a large extent, notably in the meat-packing and dairy industries, while, as previously mentioned, tinned copper pans are used for jam-making and similar purposes. An enormous amount of research on the corrosion of the tin-iron couple has been carried out in connection with the food can. Among those in this country who have made notable contributions to this work may be mentioned: T. P. Hoar,[1] T. N. Morris and J. M. Bryan,[5,6] also Hoar, Morris and W. B. Adam.[7]

Reference has already been made to corrosion caused by contact between dissimilar metals, and one example has been quoted. Another unusual one seen by the author, concerned the pressing of ox-tongues in tinplate containers. The tongues were pickled in a salt brine for a short time, cooked and then placed in the cans which were arranged in rows. An iron plate of slightly smaller diameter than the can was placed on top of each tongue and pressure applied by means of an arrangement of iron bars and weights, somewhat as shown in Fig. 3. The tongues were then left to cool and set. About 12 hours later when they were examined, it was found in the case of a few of them that the tin coating had been stripped from the bottom of the can where the tongue was pressed against it. Investigation showed that this only occurred when, as sometimes happened, there was direct metallic contact between the somewhat rusted iron plates and the cans, and that it was entirely due to galvanic action in the presence of the salt in the pickled tongues.

Such examples as this, whilst fortunately not numerous, serve to indicate the care which must be taken when dealing with different metals in the presence of electrolytes, if corrosion of equipment and contamination of food products is to be avoided.

Non-metallic materials

So far no mention has been made of non-metallic constructional materials and protective coatings for metals. These are very numerous and are undoubtedly playing an increasingly large part in the food industry. Glass pipelines, glass-lined vessels and ceramic equipment are all used to some extent. They give a high degree of protection from metallic contamination and corrosion, but are not popular with many manufacturers on account of their susceptibility to mechanical or thermal shock with, especially in the case of glass-lined open vessels, a distinct risk of getting small chips in the product. Next to toxic hazards, possible contamination of the product with glass is one of the food manufacturers' biggest nightmares.

Rubber and plastics are successfully used both unsupported and as lining materials for steel vessels. The majority of the plastics commonly used, such as the phenol-formaldehyde resins, polythene, polyvinylchloride, are themselves not attacked by the constituents of foodstuffs, but considerable care is necessary in the choice of substances used as fillers, pigments, stabilisers, accelerators and plasticisers, since many of those available are toxic and liable to be extracted, for example, by fatty substances, or they may impart unpleasant flavours or odours to the food. Similar considerations apply also to rubber. In the case of the phenol-formaldehyde plastics, incomplete cure may lead to the food being contaminated with phenol and formaldehyde, both of which are objectionable. However, all of these difficulties may be overcome by careful formulation of the plastic compositions.

One great obstacle at the present time to the wider use of plastics in the food industry is the inability of many of them to withstand temperatures much in excess of 90°C. However, it seems likely that even this difficulty may in due course be overcome.

Food factory structures

Finally, some reference must be made to structural corrosion problems in food factories. In many factories there is a considerable amount of exposed iron and steel work and the problem arises as to how this should be kept clean and free from rust. Under dry conditions, this is usually fairly easy, but under steamy, or cold and humid conditions, especially when corrosive agents such as salt, acetic acid and SO_2 are used in the factory, the problem is much more difficult. The solution really begins in the design of the building, and where a new factory is being erected, adequate attention should be paid to this by architects, consultants and others concerned. Many food factories are, however, housed in buildings of old-fashioned design, which may not even originally have been intended for the purpose for which they are now used. Protection against corrosion of steelwork may then be extremely difficult.

Most experts will agree that paints containing lead afford the greatest measure of protection, yet the food manufacturer dare not use these for fear that when they flake off, pieces may fall into the food and contaminate it with lead. As if this were not enough, the average food manufacturer is usually unreasonable enough to require his factory to be painted in the minimum of time, say during a weekend, so that production is not impeded.

Summary

From this very brief survey of corrosion problems in the food industry, several points clearly emerge. Firstly there is need for closer co-operation between the

(Concluded on page 410)

Corrosion Prevention in the BOTTLING INDUSTRY

By L. A. Johnson, M.B.B.I.*

The presence of large amounts of water and a highly humid atmosphere in most bottling departments combine to make structures and equipment particularly susceptible to corrosion. In this article the author discusses ways of preventing corrosion in this branch of the industry.

Design

OFTEN in structures of over 40-ft. roof span, back-to-back angle iron and/or compound channel structures are used. Sometimes building specifications do not allow for sufficient painting of the surfaces which after construction would be hidden or would be in such a situation that it is virtually impossible to maintain.

We have all seen cases of this type of construction and the structures above pasteurisation and bottle washers where corrosion can be rapid and will in the course of a very short period become quite dangerous.

One of the most common faults, more frequently seen in pasteurisers than in bottle washers (although it does occur in both), is the use of copper coils or copper steam injection pipes in mild-steel tanks. The corrosion of the base plates below such copper tubing can be very rapid. Much does, of course, depend on the type of water being used, but cases have been known where urgent repairs, normally of a first-aid nature, have been necessary in as little as 12 months. Unfortunately, the engineer who has not seen this problem before or who has not consulted some authority conversant with this type of corrosion problem has often been known to patch the bottom of the tank again with mild-steel plates. Of course, no matter how often this is done and no matter how this mild-steel sheet is treated, it will sooner or later suffer severe pitting.

If copper coils are used, and admittedly they are very much more efficient in heat conductivity, then these coils must be insulated completely from any contact with the wall of the tank. By this method the electrolytic corrosion which causes the severe pitting of the tank will be avoided. In the case of steam injection it is, of course, much simpler to replace the copper tubing with mild steel, as not only is it cheaper, but it can be replaced if and when necessary (and frequently it is not necessary) by any bottling engineer.

Bottle washer under construction, treated with chlorinated-rubber paint.

At the design stage it is essential for the architect dealing with a new building to ensure that any steel which is used in that building is free from millscale before priming. There are a number of ways of achieving this, varying in cost, and some more applicable to certain types of construction than others. The "Rolls-Royce" way of tackling the problem is to have steel delivered to site unpainted, then shot blasted and primed before erection. A system, however, which is now being more generally adopted (but is unfortunately somewhat restricted owing to the steel manufacturers not yet having sufficient facilities) is to use pickled steel which is passivated and primed prior to delivery.

With regard to the plant manufacturer, he can, of course, purchase sheet steel quite easily, in a pickled state, ensuring the surface is free from millscale, or can go one stage better and purchase sheet steel which has not only had the millscale removed but has received a protective coating of another metal. Normally this anodic metal is zinc and is electrically deposited, giving something in the region of ·0001 to ·0003 in. of zinc. This should not be confused with galvanising, which is admittedly very good, but is expensive and frequently difficult to handle during fabrication, particularly where welding is to be employed.

Corrosion-proof materials

The best method of corrosion prevention, of course, is to use a material which in fact cannot corrode or corrodes at a very restricted rate. Particular reference in this respect can be made to stainless steel and many non-ferrous metals and alloys; these materials are admittedly very expensive, but for certain specialised parts are frequently employed, particularly by the plant manufacturer. A more extensive use could be made of a suitable aluminium alloy in sheet form, particularly where ducting is being constructed. Not only is it light but it corrodes very slowly, and if painted correctly will give many years of trouble-free service. Its lightness also helps inasmuch as no heavy type of construction is needed to support it. The increased use of timber and plastics and a combination of these two

* Detel Products, Ltd.

materials in the resin-impregnated timber laminates can also be considered as further possibilities. The advance in the manufacture of polyester resin plastics, particularly those reinforced with glass fibre, may shortly begin to play an important part in the bottling industry, particularly as they are light in weight and can be produced reasonably cheaply, providing a run of standard items can be employed. These materials can also be made virtually indestructible, but much research and development has still to be carried out with reinforced plastics before they become more widely used.

If corrosion is present on the steel of a building, then this corrosion must be removed before painting. Where local areas of corrosion have occurred in an otherwise sound paint film, it may only be necessary to clean thoroughly and patch prime these areas. The sound paint should be cleaned of dirt and grease before applying top coats overall. All old paint which is allowed to remain (if the patch priming process is adopted) must, of course, be adhering well to the metal. However, on occasions, through pressure of production or other causes not easily controllable, steelwork is allowed to deteriorate to a state where corrosion, although small in percentage, becomes uniformly distributed over the whole area. In these circumstances it would be better to clean the whole surface thoroughly by the removal not only of the rust but of any paint compositions which may be present than to use labour and materials on an unsound base.

When thinking in terms of return for maintenance outlay it would appear that flame cleaning is most appropriate to the bottling industry. It is appreciated that oxy-acetylene is very expensive and requires skilled labour for any flame-cleaning work, but this type of equipment is more or less essential on surfaces where millscale is present, as not only does it remove the scale and rust but old paint as well.

However, if millscale is not present, a variation on this idea is becoming increasingly popular which can be used with cheaper labour and is less cumbersome to handle. That is the use of either propane or butane liquid-type gases, through a multi-purpose torch. The torch can be obtained for as little as approximately £3 and this again will remove the majority of corrosive products and old paint, and volatilise any moisture which may be present in the pores of the steel. A surface free from moisture is one of the most important factors to be considered before any painting should commence.

The essence of preventing corrosion is to eliminate moisture from the steelwork or other surfaces, without which it is virtually impossible for corrosion to occur. This is normally attempted by providing as impermeable a membrane as possible. However, consideration should always be given to the fact that there is no known coating which can guarantee a 100% impermeability and, because of this, inhibitive metals or cathodic treatments are also employed. The finest way, therefore, is to use an inhibitive form of metal passivation followed by a coating with as low a permeability as is practicable, bearing in mind price and methods of application, etc.

Paints

These days (mainly due to the high cost of labour and the more arduous industrial conditions) ever-increasing attention is being given to the degree of protection offered by paint films, as opposed to their decorative value, and to this end more and more new resins with varying properties are being investigated.

(1) **Conventional oil paints** provide the happy medium between finish, price, ease of application and reasonable life under normal atmospheric conditions.

(2) **Alkyds** or, more strictly speaking, oil-modified alkyds, have good outdoor durability and improved resistance to water and moisture.

(3) **Styrenated oil and alkyd paints** are somewhat similar to those mentioned before, but are, generally speaking, harder and dry more rapidly and have improved chemical and water resistance.

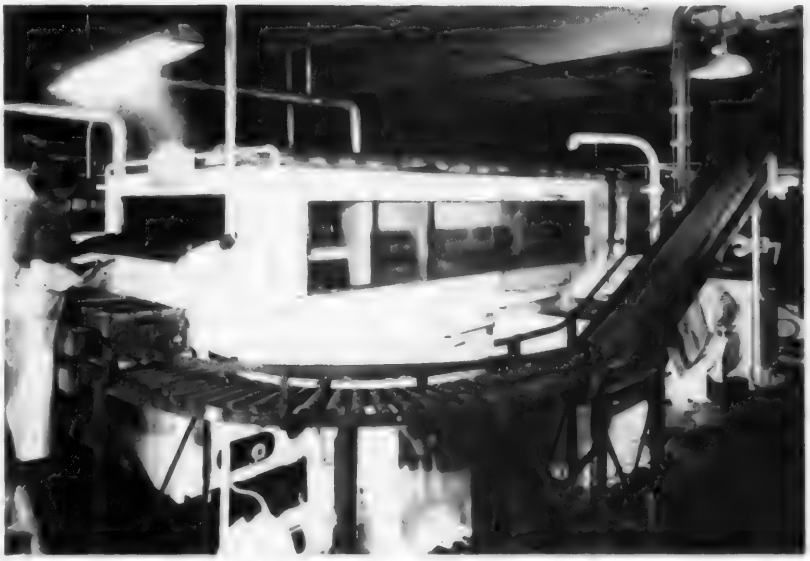
(4) **Epoxy ester paints.** The epoxy resin, to be dealt with more fully later, is cooked into an oil medium and produces a paint with good gloss and improved chemical resistance.

All this first group of paints rely on the properties and proportions of oil used, and these can and do vary considerably.

(5) **Bituminous paints** are possibly the commonest of the generally used protective coatings. Bitumen is not particularly impermeable, but because of the cheapness of the material thicknesses of coats can be built up and protection obtained in that way. Generally speaking, the coating is soft and rather dark in colour. Before considering this type of material, careful thought should be given to whether, at some future date, a more decorative scheme is going to be required, when it must be remembered that bituminous paints normally bleed through any subsequently applied material. Bitumen stop materials are available, and it is suggested that not too much reliance be placed on them except possibly to cover the residues which may be left after cleaning down prior to painting.

(6) **Chlorinated rubber.** This type of material is probably one of the most widely used in the bottling trade today because of its excellent water and chemical resistance; however, there can be no generalisation with regard to any group of paints, as no two manufacturers formulate and manufacture the same materials.

Chlorinated rubber, in contrast to the previous materials mentioned, relies for its protective properties on the formation of a very impermeable film. As a result, protective films based on chlorinated rubber may be highly effective with a film thickness of as low as ·002 to ·003 in., whereas a bituminous coating may be as much as $\frac{1}{8}$ in. In view of BISRA's report, it is obvious that better re-



Bottle washer treated with chlorinated-rubber paint. Ceiling above treated with chlorinated-rubber paint with fungicidal additive to ensure freedom from mould growth.

sults would be obtained with ·005 in. of chlorinated-rubber paint.

(7) **Epoxy paints.** These are fairly recently developed materials and are still being tested, improved and modified to suit the various conditions in industry. Their characteristics (which are of particular interest to the bottling engineer) are that they have good caustic resistance and are very adherent. However, their water resistance does leave something to be desired. There are two main types of epoxy resin paints in use (other than the ester type mentioned earlier). They are what is commonly known in the trade as the stoving type, which has to be stoved at a relatively high temperature, and the cold-cure type, in which a catalyst is used. The latter has the disadvantage of limited pot life once the two components are mixed together.

(8) **Cyclised rubber.** This material is rather specialised, but has two properties of particular use to the bottler. It is particularly resistant to hot water and can therefore be used inside pasteurisers and the like. It also has very good resistance to acetic acid, for those interested in bottling sauces or vinegar.

(9) **Neoprene.** This is a material comparatively new to this country, but in the United States it has been available for a considerable period. The chemical resistance of this material is known to be high and this is increased by the fact that a thickish coat can normally be built up without trouble. However, smell, curing time, pot life and other factors will have to be improved before this type of material becomes widely popular.

To all the paints mentioned above, various pigments for decoration or inhibition of corrosion can be added. However, care must be taken because certain colours are affected by alkaline conditions, particularly greens.

Primers

The most popular primer used is red lead. This, for the general protection of steel in normal atmospheres, is quite satisfactory, but it has two disadvantages. It is not particularly suitable for steamy atmospheres, whereas zinc-rich paints give very satisfactory results in these conditions. The second of the two disadvantages of red lead primers is very much more important. Red lead pigment is toxic to humans, and because of this the food and drink industry are wise to refrain from using it except under special circumstances or for outside work.

With zinc-rich paints, these resemble galvanising in effect and, although much has been said and written about these materials being applied to rusty surfaces, it necessarily follows that the life of a coating is reduced by this practice, as much of the metallic zinc is used up prematurely in combating the corrosion products present. It is safe to say, as with any other primer, that the cleaner the surface is to which it is applied the better the results will be. When purchasing zinc-rich paints, the material should contain over 92% metallic zinc in the dry film, as laid down by the BISRA.

The next primers worthy of mention are those which contain a zinc chromate pigment. Primers containing chromates are used mainly on aluminium, but in steamy acid atmospheres are an advantage on mild steel. Zinc chromate primers vary in quality according to the medium used and the quantity of pigment used. The concentration of chromate can be from 5 to 70% with consequent variation in price and quality.

The zinc-rich-type primer can be used on the majority of steel surfaces, but, on plant, mention should be made of its uses in pasteurisers and the rinse tanks of washers. In the pasteuriser it should be given a top coat of the cyclised rubber paint mentioned earlier. The zinc chromate type suggests itself particularly to those people bottling vinegar and also for the general priming of steel in the syrup rooms of the soft drink trade.

Taping

Another method of covering steel to prevent corrosive agents from attacking the surface is to wrap the surface with a suitable tape—normally impregnated with some type of resin to provide the impermeability necessary. Before using tape the normal preparations should be carried out and the surface at least primed and finish painted where finances permit.

Mould growth

Allied to the question, not exactly of corrosion, but of painting, is that of the prevention of mould growth. Firstly, it is necessary to clean the surface in the normally observed manner, after which the

surface should be given a liberal treatment of one of the many fungicidal washes available. This last treatment would not be necessary after flame treatment. Fungicidal washes are often based on sodium pentachlorophenol, which is sold in a concentrated form and is diluted with water. Solutions of this type of chemical kill the spores which may be laying dormant on the surface after the normal cleaning has taken place. It is essential before proceeding with any further painting that the surface be allowed to dry thoroughly. Paints containing fungicidal additives should then be applied as these do deter the development of the bacteria.

Bottling milk does not materially differ from what has been previously stated—except that mention should be made that the butter fat of milk does soften a number of paints, including chlorinated rubber. It is therefore necessary where butter fat is likely to come in contact with a paint film for any prolonged period to consider the use of one of the special paints resistant to fat, as well as the usual hot water, detergents, etc., used in the bottling department.

Others which should be mentioned are those dealing with the bottling of essences, disinfectants, bleaches, etc. Here, of course, we do not have to consider bottle washing, as usually the bottles are new. The main consideration is spillage and breakage during filling and general handling. Normally chlorinated rubber is satisfactory, but where essential oils are used then the epoxy paints seem to be the most promising answer.

Conclusion

For money to be used economically in preventing corrosion, it is first necessary that the design and initial specifications should be correct. In this respect, I would further stress the dangers of mill-scale.

Secondly, maintenance should be so planned to ensure that surfaces are treated before any severe attack has been made, to prevent the costly process of excessive cleaning and pre-treatments. Thirdly, bring into your confidence manufacturers of reputable materials and give them as much information as is possible, so that they may be in a position to provide what British science and industry can produce for your benefit.

This article is condensed from the address given by the author to members of the British Bottlers' Institute at the Hotel Metropole, Leeds, on February 3, 1958. It first appeared in the March issue of CORROSION TECHNOLOGY.

Corrosion in the Food Industry

(*Concluded from page 406*)

food manufacturers, the architects, the plant designers and fabricators and the manufacturers of the basic materials of construction. Secondly, there is need for a more widely disseminated knowledge of the fundamentals of corrosion in relation to food manufacture, both among the food manufacturers themselves and among plant fabricators. Thirdly, there is need for the recognition of food technology as an applied science quite distinct from other branches of chemical engineering.

With regard to the second point, it is clear that it is the small man, both the small food manufacturer and the small plant fabricator, who is most in need of guidance. The third point is now a long way towards achievement, with the establishment of the National College of Food Technology, which, it is to be hoped, will in due course expand its activities to include the principles of corrosion prevention and plant design in its curriculum. Meanwhile, there is little real excuse for failing to obtain expert advice which is, to a large extent, already available through the Department of Scientific and Industrial Research and its Food Investigation Organisation or through closely linked trade research associations.

(*Thanks are due to the Council and Director of the British Food Manufacturing Industries Research Association for permission to publish this article*).

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Freezing Bakery Products

IN order to satisfy the demand for greater freshness of bread and other bakery products, and for economic reasons, bread freezing is resorted to on an increasing scale. This applies particularly to countries where wheat is used exclusively or predominantly. The problem is more complicated in countries such as Germany where much of the bread is made from rye, so that two different sets of machinery must be used, and full-scale mechanisation is less economic.

The present treatise* deals with the various considerations relevant to the freezing and cold-storage of bakery products. After a brief outline of the processes which take place during the preparation of the dough, during the baking proper, and during the storage of bakery products, the author deals with the effect on these processes of the freezing and defrosting of the products, the frigorific energy requirements, and the technological and economic advantages of the method.

* *Die Frischaltung von Backwaren durch Kälteanwendung.* By Wilhelm Neumann. No. 13 of a series issued by the German Association for Refrigeration Technique ("Deutscher Kältetechnischer Verein"). C. F. Müller, Karlsruhe, 1958. Pp. 100; 31 illustrations. DM. 4.60.

PROTECTION AGAINST CORROSION

A Survey of Available Materials

A bottling machine in a large brewery in the South of England, treated with Tretol chlorinated rubber paint.

CORROSION problems may conveniently be divided into two classes—those involving protection against atmospheric conditions, such as are common to all buildings and equipment, and those involving the corrosive effect of certain substances (acids, alkalis, fats, etc.) which are peculiar to certain industries. Foodstuffs, despite their beneficial effect on the animal organism, can be extremely corrosive of inert materials, and in certain branches of the food industry corrosion problems are acute. Thus, the fruit processing industry finds that fruit acids may have a very destructive effect on structures and equipment if these are badly designed, faultily constructed, or inadequately protected. The dairy industry finds similar effects from the corrosive action of lactic acid. Fats and oils can be very destructive of non-metallic materials, and of protective coatings designed to protect metallic structures from the corrosive action of other materials. And in food factories, the frequent application of water, alkaline detergents, and sterilising agents has itself a highly corrosive effect.

Equipment and services are available from many firms for the protection of industrial equipment from general corrosion and the effects of specific corrosive agents. Tretol, Ltd., have designed a number of protective coating systems suitable for various applications. Their *Tretolastic* anti-corrosive paints and coloured bituminous coatings are amongst products recommended by the firm for the protection of metal structures from general atmospheric corrosion.

Rubber-based paints

For protection against additional corrosive substances, several materials are available from the same firm. Tretol chlorinated rubber paint is said to offer excellent protection against acids, alkalis and moisture, and will withstand mineral oils, although it is not suitable where gross contamination with animal or vegetable fats may occur. It is also recommended for marine or coastal conditions.

Tretol cold-cured epoxide enamel paints are recommended by the firm for the protection of plant and machinery subject to contact with mineral acids, fatty acids, fats, greases, solvents, etc.; a special grade is available for situations where immersion with hot water is likely to occur. The enamels are supplied as two components—base and reactor—which are mixed before application, and the curing period which is required for the paint to develop maximum hardness and resistance is about seven days at ambient temperatures.

Where metals and concrete must be protected against very heavy and prolonged chemical attack, Tretol, Ltd., provide the *Tretoprene 2C* system of protection. This is based on a synthetic rubber (neoprene) compound, and the final coating is again supplied in two parts—base and accelerator. The protective film obtained is said to be flexible yet abrasion-resistant, being akin to very tough rubber, and to withstand a wide range of chemicals including most acids and alkalis, salts, sea-water, and mineral and vegetable oils.

Where the emission of strong solvent odours makes certain protective paints undesirable, as is the case in many food establishments, the firm recommend the use of their *Tretotect* coating, which has been developed with this point in mind. This coating is also based on synthetic rubber, and is said to have excellent resistance to oils and fats. It is also claimed to have unusually good resistance to heat, having been successfully protected at 240°F.

Other protective coatings developed by Tretol, Ltd., include *Tretolin* paint, a coating based on chlorinated rubber designed for the protection of concrete, cement rendering, and other building surfaces, and *Tylex*, which is said to give a tile-like finish without the disadvantages of the interstices of tiling. Its use is therefore indicated in food-producing establishments and other areas where absolute

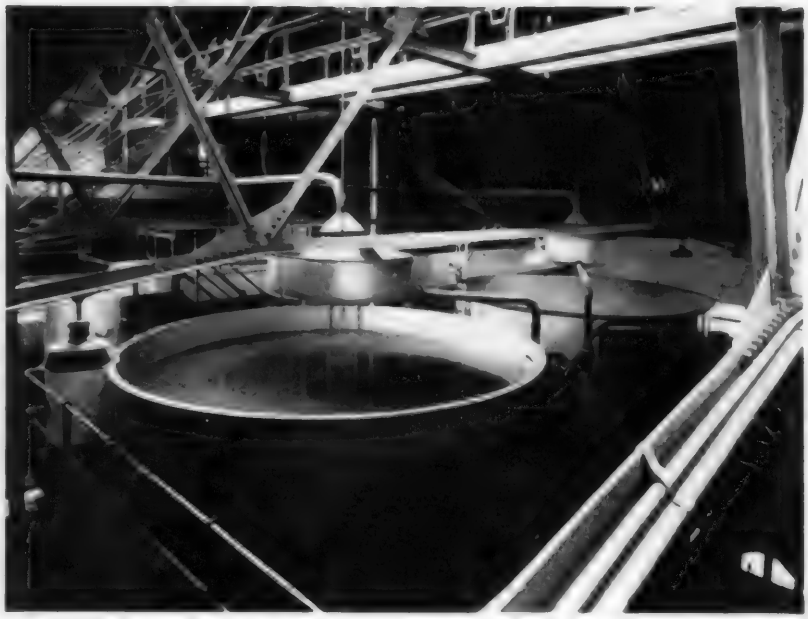
cleanliness is essential. It is said to withstand humidity, steam, fats, and mould growth, and to maintain its gloss irrespective of frequent washings.

Continuous plastic coverings

Tretol, Ltd., have also recently announced the development of a *Tretoplast* system for the treatment of walls and ceilings of buildings immediately after construction. By this system a tough, elastic, impermeable plastic skin is provided to overall surfaces by spray application. The skin is of appreciable thickness, and is said to be resistant to most forms of chemical attack as encountered in the food industry, and to be specially indicated where wet or steamy processes are involved. It permits frequent cleaning by hosing or the application of sterilising washes without risk of water reaching the backing surfaces. By the complete elimination of all joints, a very high standard of bacteriological cleanliness can be achieved, and considerable economies of construction are also said to be possible, since cheaper backing materials which would otherwise be unsuitable are rendered innocuous.

A new wall surfacing technique intended to replace tiling has also been introduced recently by Coltrate, Ltd., who claim that the surface can be applied in almost any circumstances, and to any base, without a join, no matter how large the area to be covered. This new finish, *Coltrate W.S.*, has been specially designed for use in food factories, breweries and chemical works, where corrosion may be very severe or hygienic conditions are of paramount importance. It is said to be completely stable under a wide range of temperature conditions from freezing-point to about 140°F., and to withstand without trouble frequent temperature fluctuations within that range. The treatment is also claimed to be sufficiently flexible to withstand the settlement of new buildings without damage —an important factor in continuous large-area coverings of this type.

The outer skin is said to be highly resistant to water and chemicals, so that it can be cleaned and sterilised without difficulty. The material is available in a wide range of colouring, and is said to be competitive in price with conventional tiling.



A view of the maltings at Great Yarmouth Brewery Co., Ltd., where extensive use has been made of Detel coatings.

Protective finishes

Another firm specialising in the production of protective and anti-corrosive coatings is Detel Products, Ltd. These may be used on walls, floors, and all surfaces which come into frequent contact with steam, water, fruit acids, alkalis, etc. A surface of very low permeability is provided, and suitable grades of *Detel* coating may be used on cooling coils, which are subject to particularly arduous conditions. Fungicidal additives are available for the inhibition of mould growth.

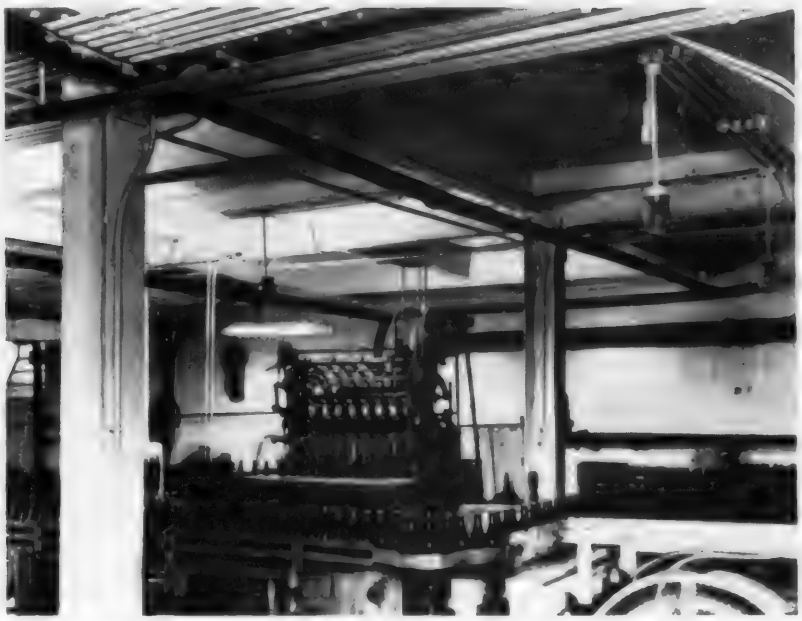
Detel metal undercoat, a zinc rich primer, is also recommended by the firm for use, with suitable top coats, for structural steelwork, canning equipment, etc., in areas where water and steam abound. The low permeability of Detel coatings, coupled with the rust-resisting and heat-resistance (up to 400°F.) of the primer, are said to provide an extremely durable finish.

Suitable grades of *Detel* coating have been particularly recommended for the protection of concrete floors against the ravages of fruit acids; dusting of the concrete is also prevented. The coatings are resistant also to alkaline detergents, so that the floors can be washed continually without deterioration of the coating. Mechanically damaged areas can be repainted at any time, the new coating binding effectively with the older one to provide an unbroken protective layer.

For plant and equipment used in the manufacture of vinegar, *Detel H* grade, which has been specially formulated for the purpose, is recommended by the company.

Epoxy resin paints

Mention was made above of an epoxide enamel designed to provide a corrosion-resistant covering. Paints based on epoxy resins are now finding increasing use in the food industry, and several examples may be quoted of the use of *Epikote* resins, made by the Shell Chemical Co., Ltd. One such concerns the factory of the New Zealand Refrigerating Co., Ltd., of Christchurch, which has recently been extended at a cost of £½ million, and is one of New Zealand's most up-to-date slaughter-



A general view of a bottling plant, showing mould growth on the right (untreated) side of the ceiling. The rest of the ceiling has been treated with an Epikote-based paint, which has effectively prevented the growth.

houses and meat-canning plants. The walls of the new abattoir are covered in plastic panelling to a height of 4 ft., and all wall surfaces and ceilings have been covered with *Epikote*-based paint. The same paint was also used on open floor drains and on sections of the floor that are not used as working surfaces. Coatings based on *Epikote* were also used for the canning room, where the prime requirements were resistance to animal fats, moisture, and detergents. This section of the factory was previously re-painted every year, but the *Epikote* paint has now stood up to two years exposure without deterioration, and plans for re-painting are said to have been postponed indefinitely.

Use in brewing industry

Epikote-based paints have also been used extensively in breweries, where conditions may be highly conducive to corrosion. The firm of R. and W. Paul were for some time troubled with the walls and ceiling of their malting room, which are always covered with condensation and previously had to be repainted every 4 to 6 weeks. A covering of amine-cured *Epikote* resin paint was then applied, and this is reported to have remained in perfect condition 8 months after application.

Another English brewery faced an even more serious problem, when alkaline spray and moisture from a bottle-washing plant were found to be severely corroding the roof girders, and pitting the concrete so that mould-growth was developing. The steelwork was stripped and cleaned, the concrete was replastered, and the whole was treated with *Epikote* resin paint, which is now said to be in perfect order after considerable use.

A third example involving the use of these paints in the brewing industry concerns the premises of Aitkens Brewery in Falkirk. Their problem also involved the bottle-washing and bottling departments, where the steam and the effect of cleaning agents was found to be very destructive of normal paints, permitting the growth of moulds. Even a rubber-based paint incorporating a fungicide did not give adequate protection. In an experiment carried out at the brewery, the results of which are shown in the accompanying illustration, part of the ceiling was painted, after cleaning, with the rubber-based paint and the remainder of the ceiling, the walls, and the steelwork, with *Epikote* L-8 ester containing a fungicidal additive. This was found to give adequate protection over a test period of 9 months, during which time the area painted with rubber-based paint showed extensive mould-growth.

Among the firms making paints based on *Epikote* resins, Evode, Ltd., feature prominently. Their *Evokote* range comprises four types of paint—two "one pack" and two "two pack" systems. These have been formulated to combine maximum chemical and corrosion resistance with hardness, adhesion, and flexibility, and are already finding many applications in the food industry.

Evode, Ltd., also manufacture *Evodyne*, a chlorinated rubber paint. This heavy-bodied, chemically resistant paint may be applied to iron steel and wood, and is also suitable for the treatment of alkaline surfaces such as concrete, asbestos, brickwork and cement. It is highly resistant to acids, alkalis and brine, and is sufficiently rapid-drying to be overpainted in 12 to 24 hr.

Another Evode development, *Bitugel*, is a gelled solution based on pure asphaltic bitumen, and is designed to cut the costs of protective painting by providing in one coat a film thickness five times greater than a conventional 3-coat system. It contains a corrosion inhibitor, and is said to have exceptional resistance to the penetration of water and to be unaffected by dilute acids and alkalis. It is strongly adhesive, and can be applied to moist surfaces.

British Paints, Ltd., also make paints based on *Epikote* resins. Their *Epilux 1* air-drying enamel is available in a range of 13 colours where maximum resistance is required, other colours being available for less exacting situations. *Epilux 4*, another corrosion-resistant preparation made by the same company, which is claimed to be exceptionally resistant to oils, is available in 7 colours.

Another product of British Paints, Ltd., *Epilux 5*, combines the protective properties of epoxy resin with those of coal tar pitch,

and is specially recommended by the firm for the treatment of structural steelwork and pipelines called upon to resist the most severe marine atmospheres and industrial corrosive conditions.

The *B.P.L. Anti-Condensation* coating is another interesting product of this firm. This is a heavy-bodied paint which is usually applied in two or three coats to give a film thickness of about 0·03 in. This has a much greater insulating value than a normal coat of paint, and it is upon this and its absorptive nature that the inhibition of condensation depends. The film is said to dry hard, adhere well, and to have good indoor durability.

The heavy industrial duty of which chlorinated rubber paint is capable is exemplified by its use in the copper room of a brewery, as pictured here. The paint was supplied by Evode, Ltd.

Fungicidal paints

B.P.L. also make fungicidal coatings for various applications. Their normal gloss paints, undercoats, emulsion paints, etc., can be supplied in fungicidal quality, but for use in damp conditions they recommend their fungicidal enamel.

A new series of anti-fungal paints has recently been announced by Ribble Paints and Varnishes, Ltd. Known as *Sterilizer* paints, they are specially designed to destroy micro-organisms. They are said to be active against Salmonellae and Streptococci, as well as moulds of the Aspergillus, Penicillium and Pullularia types, *Rhizopus nigrans, Mucor racemosus,* Leuconostoc, and wild yeasts. Coliform and faecal organisms are also said to be destroyed as are several pathogenic organisms responsible for various infections amongst factory personnel.

The paints are said to be non-toxic and free from undesirable odours. The bactericidal action is claimed to be physical rather than chemical, so that the paints do not lose their protective action with time. They are available in gloss, semi-gloss, and flat finishes.

Emulsion paint

A new emulsion paint, known as *Plec,* has been introduced by Corrosion, Ltd. It is based on polyvinyl acetate and copolymers, and is said to have a number of technical features which place it in the forefront of protective plastic-based paints. The standard material is said to conform to all existing specifications, including the new ones laid down in the Factories (Cleanliness of Walls and Ceilings) Order, 1958, but it can be supplied at the same price to conform to any particular specification not complied with by the standard material. It is available in 15 pastel colours suitable for indoor and outdoor use.

A new range of chlorinated rubber paints has also been introduced recently by Corrosion, Ltd. Pointing out that chlorinated rubber paints have in the past been widely criticised on account of their tendency to "cob-web," one coat picking up previous coat when applied, the firm announce that this drawback has now been completely overcome. Criticisms of the long-drying time usually associated with paints of this type are also said to have been met. *Avigel 250,* one of the new paints in this range, is said to have a drying time quick enough to give the most economical application, but slow enough to provide a wet edge for joining up when work has to be left off for a meal interval, etc. In addition, special types have been introduced for application to wet surfaces (*Avigel 250 Wet*) and also with fungus-resisting properties (*Avigel 250 FR*) for use where mould and fungus growth creates problems.

Avigel 250 is available in a full range of primers, undercoats and glossy finishing coats.

Industrial finishes

A range of paints for industrial use are also made by the Walpamur Co., Ltd. The basis of all paint finishes where durability and resistance to corrosion are factors of prime importance lies in the preparation of the paint-bearing surface, and the firm's catalogue of industrial finishes begins with a useful article on the pre-treatment of metal surfaces. Materials provided by this company's *Ferox* industrial range include stoving and air-drying primers, fillers and stoppers, stoving finishes, air-drying enamels and varnishes, and quick air-drying enamels based on styrene and styrenated alkyd resins.

Other products of the Walpamur Co., Ltd., include *Walpamur Glossy Finish,* a water-thinned covering for walls, etc., which dries with a hard, glossy and washable finish; *Ferox* fume-resisting enamels; and *Ferox* machine enamels, the latter designed to resist the action of heat and mineral oils. Chlorinated rubber based protective paints are also supplied.

Protection of pipes

Several methods of protecting pipes and equipment, other than by the use of paint, have now been developed. On p. 420 of this issue,

we describe the use of *Denso* materials, made by Winn and Coales, Ltd., in the insulation of refrigerant pipelines. Although designed primarily for the purpose of insulation, the *Denso* system, by isolating each part from air, moisture, gases and chemical fumes, contributes very appreciably to the protection of the structural materials from corrosion. It also helps to reduce condensation, and to minimise the effect of any condensation that does occur.

A Doulton filter unit, enclosed in nylon by Durable Plastics, Ltd., to give a non-toxic, sterile, corrosion-resistant coating to the cast iron.

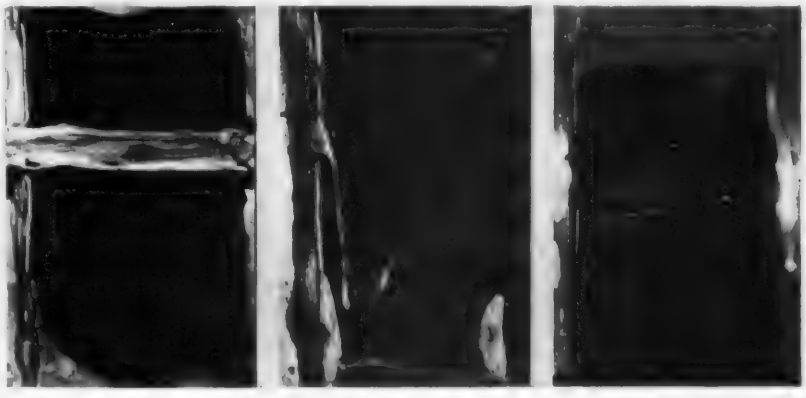
Plastic linings

Another method by which equipment can be protected from corrosion is by its total covering with plastic material. Durable Plastics, Ltd., specialise in the plastic coating of all types of factory equipment. Tanks and vats, for example, may be coated with *Vylastic S* polyvinyl chloride, so that the structural advantages of steel are combined with the chemical resistance of P.V.C. *Vylastic S* is a specially compounded grade of P.V.C. designed to give a coating completely free from porosity and with high resistance to abrasion. It can be applied by the dip method, but is more usually sprayed to give a coating of $\frac{1}{16}$ to $\frac{1}{4}$ in. Another useful example of the coupling of metal strength with plastic inertness is provided by the case of pipelines and manifolds, which can be coated with polythene, etc., to give units with the advantages of polythene piping but with the pressure-resistance and mechanical strength of steel. The coating is at the same time brought over the flanges of the pipes to form a gasket.

Apart from P.V.C. and polythene, coatings may be of nylon, neoprene, polytetrafluoroethylene (P.T.F.E.), and polytrifluoromonochlorethylene (P.T.F.C.E.). The P.T.F.E. is of considerable interest to manufacturers handling sticky products such as doughs, as it is remarkable for its non-stick properties.

Plastic pipe-lines

The firm of H. Incledon, Ltd., make a range of corrosion-resistant piping fabricated entirely from plastics. Known as *Durapipe*, it is available in three grades—*Z* (high-density Zeiger polythene), *K* (rubber resin blend), and *N* (polyamide). A range of fittings are made in the same materials. Jointing of pipes may be carried out, in the *K* grade by means of a cold solvent weld, allowing pipe lines to be extended or altered with the minimum of trouble, at the same time ensuring an unbroken internal surface to the pipe. *Durapipe* has been used for the transporting of fruit juices and brine, both highly corrosive materials, and for the fluming of peas in water, as well as for carrying chlorine solution for in-plant sterilisation and the removal of effluent liquors to the discharge point. Grade *K Durapipe* has recently been installed at the new Bridge Park factory of J. Lyons and Co., Ltd., for the transportation of chlorine solution.



Results of sagging test. *Left:* **Bitugel wet film at 50 thou thickness.** *Centre:* **Competitor's heavy-duty bitumen at 50 thou wet film.** *Right:* **Another bitumen at 10 thou wet film.**

▶A booklet called *A Store of Temperature Measurement* has been published by Negretti and Zambra, Ltd. It describes the evolution of the "liquid-in-glass" thermometer. A number of recognised works on the subject have been studied in the compilation of this book and a bibliography is given for those who may wish to read more.

▶A booklet has been issued by Henry Simon, Ltd., and Simon Handling Engineers, Ltd., which gives information on their *Select-O-Weigh* automatic proportioning system. The system is described as being applicable to almost any industry in which materials are mixed into batches of fixed or variable formula. Some of the installations which are now in use in a wide variety of factories are illustrated. These illustrations are supplemented by flow sheets explaining the operation of the system in the various installations. Among the examples is one which is in operation in the recently completed factory of one of the larger British biscuit makers.

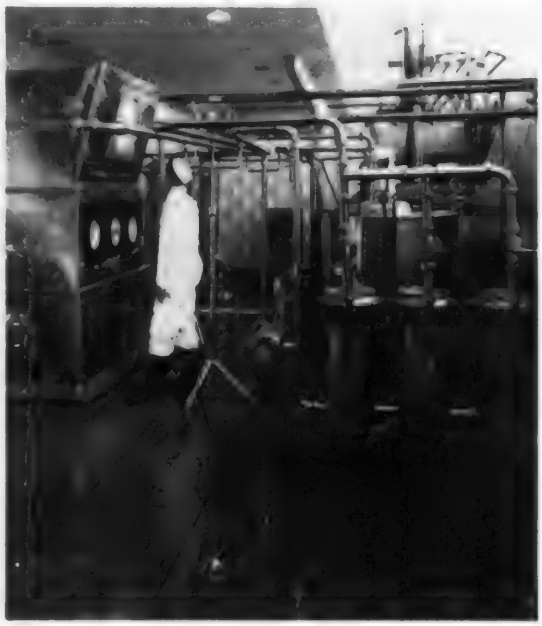
CORROSION RESISTANT FLOORS at an Ice Cream Factory

CLAIMED to be the best equipped and most advanced ice cream factory yet built, a new £1½ million plant has recently been placed in production by J. Lyons and Co., Ltd., at Bridge Park, Greenford, Middlesex. One of the features of the plant has been the installation of waterproof flooring for the production area, which in this factory is on the first, rather than the ground, floor. In addition, certain special areas, particularly that of the continuous mixing plant and the flooring in front of the mix storage vats, required corrosion-protective treatment. This was carried out by Acalor (1948), Ltd., chemical engineering contractors and specialists in acid-resisting cements.

Underlying this anti-corrosion treatment was the need to prevent the jointing between the tiles from being attacked chemically by milk and other ingredients in the ice cream mix. The tight waterproofing was called for to withstand the constant washing down necessary in the interests of hygiene, and so that there was no danger of water or liquid products finding their way through any joint or crack into the concrete layer beneath, where they might cause serious damage.

In all dairies and many food factories, lactic acid, (which is present in fresh milk), sugar and fat are all enemies of ordinary concrete. Some detergents used for washing down may also have a harmful effect on the floor tiling if this is laid in ordinary cement. The damage that could be caused by expansion and contraction of the floor surface as a result of washing down with hot and cold liquids has also to be guarded against.

To meet these problems, the tiles laid in the special areas at Bridge Park were bedded on an Acalor latex cement and the joints between each tile were bonded with an Acalor corrosion-proof cement based on synthetic resin.



Part of the Acalor corrosion-resistant floor at the new factory J. Lyons and Co., which is described in this article.

In recent years, two resins in particular have been developed which have outstanding properties for floor work. One is based on oil from cashew nuts and the other on a by-product obtained during the manufacture of cereals, known as furane. It was one of these furane-based resins, formulated to withstand the special conditions encountered in an ice cream factory that was used at Bridge Park.

As well as supplying the latex cement and the bonding material Acalor were responsible for the actual laying of the tiles and ensuring that every joint was perfect.

Carried out by William Briggs and Sons, Ltd., the waterproofing was achieved by laying a double membrane of *Aqualite* ⅛ in. thick bituminous sheeting. The first layer was set directly on the concrete and the joints between the various sections of membrane were sealed with a blow lamp. Then the second layer was put on top of the first, with the joints staggered. Blow lamps were used to weld the two layers of membrane together.

Special care had to be taken at the many holes in the floor through which piping etc. pass. Each hole was provided with its own collar to fit the particular pipe and the contractors had to build up the membrane around these collars and make perfect joints to the waterproof fabric below.

JOHN GRINDROD.

Fisheries Year Book

The new edition of this useful manual* begins with a brief review of the fishing industry in different parts of the world, followed by more detailed studies of the industry during 1957 in Britain, Iceland, Denmark, Holland and Germany. Chapters are then devoted to the work of F.A.O. in fisheries, fishery research, and the preservation of fish. Mr. Eric Hardy's chapter on fish varieties on the market has been revised since the last issue, and contains useful information, not always readily available elsewhere, on the scientific and local names, seasons and uses of fish of commercial importance.

The directory section constitutes a valuable guide to exporters, importers and manufacturers of fish products, fishing equipment, and processing and packaging machinery.

* *Fisheries Year-Book and Directory*, 1958. British-Continental Trade Press. Pp. 466. 20s. net.

The Problem of Improving Nutritive Value

With Special Reference to the Enrichment of Foods—4

By E. Menden and H. D. Cremer*

In Part 4 of this article the authors continue their discussion of the substances available for the enrichment of foods. They consider the minerals calcium, iron, iodine and fluorine, and proteins and amino acids.

2. Minerals

Calcium

The most important foods covering the requirements of calcium are milk, cheese, and (to a lesser extent) vegetables and bread.[173] It has already been shown (see under "Other influences of food processing on nutritive value,"—Part 2 of this article) that the good supply of calcium in bread is offset by the fairly high phytin content which leads to the formation of poorly-absorbed calcium phytate. Proportionately more phytin is found in flour of high-extraction than in flour of low extraction; however, low-extraction flour also contains less calcium. Hence, the enrichment of flour and bread with calcium has been urged, especially in low-extraction flour,[45, 46, 47, 50, 52, 53, 62, 140, 161, 174] but also in high-extraction flour, as well as in wholemeal bread.[174-180]

To accomplish this enrichment, several calcium salts have been proposed, such as calcium chloride,[179] calcium lactate,[175] calcium carbonate,[45, 47, 50, 51, 53, 174, 177, 180, 181] calcium phosphate,[53, 161, 165, 174] and calcium sulphate.[165] The most favoured method, and the most economical, seems to be supplementation with calcium carbonate. The calcium carbonate used may be added as chalk or as "creta preparata."[51, 177] It must be absolutely pure; especially must it be free from sand;[50, 181] and it must not affect the quality of the bread.[51] If calcium phosphate is used, the fluorine content must not exceed 300 parts per million.[53]

Under German conditions, the desirable amount of calcium supplementation of flour is given as 2·8 g. to 4 g. of calcium carbonate,[15, 180] or 5·4 g. of calcium phosphate, per kilo.[161] In other countries, the proposed or the statutory supplementation to flour lies between 650 mg. and 2,000 mg. per kilo for low-extraction flour;[53, 140, 157, 174, 177, 178] between 1,200 mg. and 2,000 mg. per kilo* for "uniform flour" (85% extraction);[140, 157, 174, 178] and between 2,000 mg. and 3,000 mg. per kilo* for high-extraction flour (92% extraction, or wholemeal flour.[53, 157, 174] Calculated as calcium carbonate, the average supplementation corresponds to 3·1, 4·0 and 6·25 g. per kilo of flour, respectively.

A supplement of absolutely pure calcium carbonate to flour is harmless in every respect.

Iron

The foods most important for ample supplies of iron are vegetables, fish and various animal organs, especially the liver.[173] Flour and bread are the only foods which have been considered for supplementation with iron.[53, 140, 161, 163, 165, 182]

"Reduced iron," ferric sulphate, or similar compounds of reduced iron are proposed, or used, to accomplish enrichment in practice.[53, 140, 157, 161, 163, 165] The use of the sulphate of iron seems to be the most suitable method of enrichment since the end in view can be easily attained, and the effects of this compound of iron on the human organism are known.[182] However, in the U.S.A. and in England "reduced iron" is, almost exclusively, the supplement added to flour. This is because the ash content of the flour should be kept very low, and this is not possible if the relative proportions of other salts of iron are employed. The proposed, or recognised, amounts of iron for supplementation lie between 13 mg. and 35 mg. per kilo of flour;[53, 140, 157, 161, 163, 165] this corresponds to an average supplement of 65 mg. of anhydrous iron sulphate per kilo of flour. No harmful effects from these supplements of iron to flour need be feared.[182]

Iodine

Because of chronic deficiencies of iodine, or because of endemic goitre the enrichment of nutrients with iodine is already compulsory in many countries—in Switzerland, for instance,[59] and in various North and South American countries.[10, 56, 132]

Table salt generally serves as the carrier for iodine; the iodine is added as potassium iodide. The amount of potassium iodide added to table salt is given as 0·02 g. to 0·1 g. of potassium iodide per kilo.[10, 59] From levels recommended by the FAO, a supplement of 50 mg. to one kilo of table salt appears to be a minimum and 100 mg. to one kilo of salt a maximum;[56] an average consumption of table salt of 10 grams per day is recommended.[56, 59]

The stability of potassium iodide in table salt is satisfactory; even after storage for ten months, no measurable loss of potassium iodide was found in enriched table salt.[56]

No harmful effects from salt enriched with iodine need be feared; potassium iodide has been added to table salt for twenty years in many countries, without any known adverse effects.[56]

Fluorine

The enrichment of nutrients with fluorine is intended to reduce dental caries which is widespread and frequently "epidemic." In

* Director, Institute of Nutritional Science, Justus Liebig University, Giesen.

* Calculated as calcium.

1950, the first of such measures was inaugurated in various states of the U.S.A.; one mg. of fluorine per litre of drinking water was regularly added. By 1952, a significant reduction in the frequency of caries in children could already be observed.[11]

Other than drinking water, table salt and milk have also been proposed for enrichment with flourine;[58,59] however the enrichment of drinking water probably offers the best guarantee of success in such a measure of enrichment. Sodium fluoride and sodium silicofluoride have been proposed as fluorine compounds which should considerably reduce the cost of the process of enrichment.[11]

The amounts of sodium fluoride necessary for the enrichment of table salt are given as 100 mg. and 200 mg. per kilo.[59] The enrichment of milk calls for an addition of 100 mls. of a 2·2% solution of sodium fluoride to every 1,000 litres of milk; this corresponds to a content of 2·2 mg. of sodium fluoride per litre of drinking milk.[58] Under European conditions, a supplement of 2·2 mg. of sodium fluoride per litre is proposed for drinking water.[58] It is effective only where a technically perfect and sufficiently plentiful supply of pure running water can be guaranteed for large groups of the population. The daily average water intake is estimated to be 1·2 to 1·6 litres.[58]

There is no doubt about the prophylactic action of fluorine ions against caries. However, in Europe, measures involving fluorine are generally considered to be experiments only; it seems most desirable nevertheless, that these measures should be finally adopted.[58]

3. Proteins and Amino-Acids

Enrichment with pure protein, as or with the various amino-acids, has, as yet been proposed only for cereals, primarily for flour and bread; occasionally, also, for rice. Particularly with these staple foods, a fundamental improvement in the supply of protein is possible, for large groups of the population, by a form of enrichment which consists of relatively small additions.

Proteins

Lactalbumin, particularly in the form of casein, is the most important pure protein for enrichment.

Lactalbumin is important because it is one of the few (biologically) "first-class" proteins; it is the cheapest, and it can be applied in the most diverse ways.[183,184] Lactalbumin contains sufficient amounts of all the essential amino-acids, and it is particularly suited to complete the (biologically) "second-class" proteins of grain-products.

Casein, the principle component of lactalbumin, is proportionately rich in lysine.[16] A deficiency of lysine in grain-protein is the main reason for its comparatively low biological value.[77,185] Hence, the addition of casein to wheat flour results in a great improvement in the biological value of grain-protein; this has been demonstrated by growth reactions.[186,187] Proposals to enrich flour with casein on a large scale have not, however, been made as yet; usually milk powder has received preference as a "lactalbumin preparation" mainly for economic reasons.

Proposals to achieve an improvement in the biological value of grain-protein by supplementation with gelatine are of minor importance.[186,187,188] Gelatine is, also, proportionately rich in lysine,[85] but it shows a complete absence of tryptophan; and it is, technically, less suitable for enrichment measures. In consequence, no practical suggestions for enriching flour with gelatine on a large scale have been made.

Amino-acids

The biological value of grain-protein is limited, primarily because of its low content of lysine; it was therefore, obvious that enrichment with the amino-acid lysine should be undertaken in order to improve the biological value, and, by so doing, to increase the value of grain-products as suppliers of "first-class" protein. Experiments were undertaken in various ways. The biological value was tested not only in animal experiments,[42,43,188-193] but also in experiments with humans.[190,194] All the results obtained show unequivocally that a considerable improvement in the nutritive value of the protein occurs; in fact, this almost reaching the nutritive value of casein itself.[194] The lysine supplement in the flour amounted to 0·1% and 0·8%.[42,43,188,194,195] A supplement of 0·4% would probably be optimal.[191]

The stability of lysine is affected by the baking process; losses of between 9% and 24% must be expected.[195,196] Maximum improvement in the biological value of the protein in the bread can thus be attained only if sufficient *additional* lysine is provided in the bread to offset these losses. If only the theoretical amount of lysine is baked in the bread, the beneficial effects of this addition are insignificant or completely absent. The losses may be due to the assimilation of the free amino-acids by micro-organisms present in the dough, or to the destruction of the amino-acids on heating—as in the Maillard reaction.[197] The differences between bread containing additions of lysine adjusted for baking losses, and bread containing only the theoretical amounts of lysine used in the enrichment of bread are always found to be least in the whiter types of bread, and greatest in wholemeal bread (which has a high content of reducing carbohydrates).[198]

Lysine suitable for enrichment can be produced either by isolation from natural products, or by synthesis. In this particular case, the natural product is unquestionably more effective than the synthetic product. This is because the "natural" form has the spatial chemical configuration which can be fully utilised by the human organism. Like all synthetic optically active substances, synthetic lysine shows racemic forms, and these racemic forms are only partially utilised by humans.[197,199] When considering the promotion of the enrichment of bread[61,185,200] or of rice,[201] with lysine, however,

limiting enrichment to the use only of "natural" lysine cannot at present be considered, for economic reasons. If occasion arose, higher levels of the amino-acid could be considered—so long as a positive effect was still obtainable after the addition of *synthetic* lysine.

A practical programme for the enrichment of bread with lysine has not yet been reported. This is probably due to the fact that, until the present time, experience was lacking concerning the manner in which humans are affected by long periods of continued daily intake of small amounts of racemic amino-acids. Before the enrichment of nutrients with synthetic amino-acids can be introduced it must be established that ill-effects do not develop from continuous intake. Brief animal experiments revealed no indication of any harmful effects.[139] Later experiments, which covered more than seven generations of animals, however, raised some doubt about the acceptability of enrichment of nutrients with racemic amino-acids.[197] Particular importance is attached to the possibility of imbalances of the amino-acids eventually appearing. The experimental evidence available has shown that there are distinct correlations between the amino-acids and these must be recognised: changes in these correlations, creating imbalances of the amino-acids, cause disturbances in protein metabolism. There are several different mechanisms which can cause imbalances of the amino-acids.[197]

1. If the addition of a particular amino-acid (known to be the primary factor limiting the biological value of a diet unsuitable as regards its content of protein) is made to a diet, then a deficiency of another amino-acid which was previously a *secondary* limiting factor may suddenly appear. The additional supplementation of the amino-acid which is the *primary* limiting factor in the metabolism of the protein usually results in an increase in the consumption of protein.

2. Similarly, the addition of an amino-acid which is a *secondary* factor limiting the biological value of a protein can aggravate the symptoms of loss of protein caused by an amino-acid which is a *primary* factor limiting biological value.

3. The addition of an excess of any single amino-acid, even to a diet ideal in every respect, causes the biological value of other amino-acids present to fall so much that symptoms of deficiencies appear.

4. An excess of one of the amino-acids can influence the amounts of other nutritional factors (as, for example, pyridoxine) required, so that "normal" amounts are no longer sufficient.

Hence, indiscriminate enrichment with the amino-acids must be avoided.[197] Supplementation with the amino-acids should be undertaken only where definite deficiencies exist because certain amino-acids act as limiting factors to the proper use of the proteins available. If the supply of *all* the amino-acids is assured, in sufficient quantities, then the addition of single amino-acids, first, has no effect on the biological value of the proteins present and is, therefore, useless; and, second, may induce actually harmful effects from the amino-acid imbalance thus produced.

Improved biological values can also be attributed to *threonine*[42, 43, 189, 192, 201] and *valine*[42, 43, 189, 192] when these are added to grain-products used in animal experiments, even if not to the same degree as lysine. The observations made regarding the enrichment of foods with lysine may be repeated for the practical implementation of enrichment with these other amino-acids.

It may be mentioned that it is possible to achieve improvements in the nutritive value of the proteins in vegetables and in roots[61] by the addition of *methionine*, lysine and *tryptophan*; this is not, however, considered to be of much importance for human beings.

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Insulating Refrigerant Pipelines

Modern materials have made the job of insulating and protecting pipelines carrying heated or cooled liquids quicker, better and cheaper. This article describes the insulation of newly-installed refrigeration plant at a food factory in Amersham.

THERE are many ways of insulating heating and refrigerating installations to prevent undue loss or gain of heat, but most of the materials available maintain their efficiency only if kept perfectly dry and the circulation of air through the insulation is prevented. In the past, it has been common practice to wrap the insulation with hessian or a similar absorbent fabric, and to apply a liberal coat of hot bitumen.

This is a messy and unpleasant job, and suffers from the further disadvantage that, once installed, such a system must be considered more or less as permanent. If it becomes necessary to repair, modify or extend the pipe runs, the insulation is very difficult to remove. More often than not it must be chipped away, so that it cannot be used again.

Greater efficiency and flexibility can be obtained by using some of the modern materials now available. A good example is furnished by the extensions of the refrigeration installation recently carried out at the Amersham works of G. Brazil and Co., Ltd., manufacturers of sausages, pies and tinned meats. The various processing departments are served by a central refrigeration plant, which circulates brine at $-5°C.$ at a rate of 15,000 gal per hr. Steel pipes carry the refrigerant to the slaughterhouse, meat selection departments, sausage room, canning section, bakery, pie cooling room, maturing rooms, meat freezers, kitchens and cold stores. One of the new pipe runs is illustrated in Fig. 1, which shows two sections of the 2½ in. flow and return refrigerant main passing from building to building at high level.

To enable the refrigerant to do its job and to reduce power consumption to a minimum, the brine must be prevented from being heated in the long pipe runs.

Fig. 1. Applying thermal insulation to a 2½ in. refrigerant flow and return main. The steel pipes are lagged with two layers of 2-inch cork sections set in Densoset, and are overwrapped with Denso Tape.

As the surrounding air may be about 80°F. warmer than the brine during the summer months, the need for efficient lagging is obvious. The pipes are therefore lagged with two layers of cork, each of 2 in thickness, since the greater part of the pipe run is out-of-doors. For this latter reason it is also essential that the waterproofing must be very thorough. It is equally important to employ a bonding medium which ensures that the insulant is maintained in intimate contact with the pipe surfaces throughout to avoid the possibility of entrapped moisture condensing on the pipe surfaces, at the low temperatures involved.

Granulated bonded cork was selected as insulant, partly because of its efficiency, and partly because it is available in performed half-cylindrical sections to fit standard pipes, so that it is easy to use. Before the shaped cork sections are applied, the surfaces of both pipe and cork are liberally smeared with *Densoset* paste, a neutral compound based on saturated petroleum hydrocarbons, which has been specially developed for refrigeration work. It contains inert siliceous fillers, and is unaffected by temperatures between $-50°F.$ and $+90°F.$ The cork is firmly bedded in the paste, which effectively excludes all air from the mating surfaces. The mating faces of the cork sections themselves are similarly treated. In Fig. 4, which illustrates part of one external pipe run, one of the outer layers of cork is being applied. The paste is sufficiently tacky to hold each section firmly in position until the whole assembly is tied in place with galvanised wire.

The interstices between irregular sections of cork, and the awkward corners such as that beside the angle girder in Fig. 4, are filled with *Densofil*, which is similar to the paste but has a higher proportion of fillers and contains granulated cork, so that it forms a non-setting, workable putty of high insulation value. When the job is completed, it forms a continuous, 4-in. gap-free thermal barrier, within which the steel pipe is completely sealed off from the air.

To protect the cork against moisture, it is finally wrapped with *Denso Tape*, as shown in Fig. 2. This tape consists of an open-weave cotton strip thoroughly impregnated and heavily coated on both sides with a compound similar to *Densoset*, but

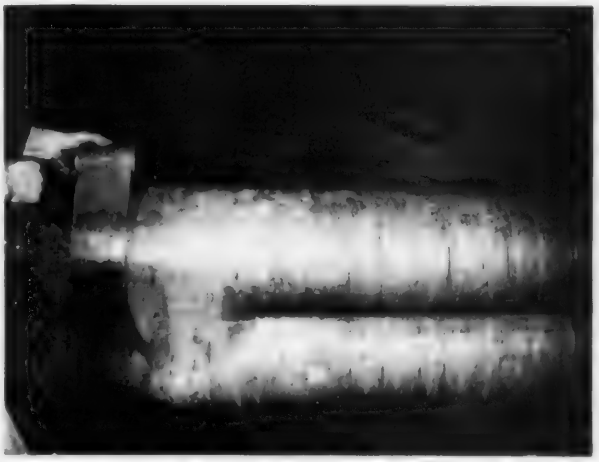

Fig. 2. Permanent outer protection is afforded by non-setting Denso Tape, applied over both pipes. To eliminate air spaces, the tape is slit, pressed into the fairing, and finally sealed with horizontal strip.

Fig. 3. A 3-inch valve at the main brine pumps, which has been replaced, using the original cork and filler removed with the old valve.

designed to remain unaffected by temperatures up to 130°F., to render it suitable for use in direct sunlight in our climate. In the section illustrated in Fig. 2, flow and return pipes run close together, and the wrapping embraces them both. The tape is applied spirally with a slight overlap between successive turns. It is then cut with a sharp blade along the line between the pipes, and the loose ends are pressed firmly down between the pipes. The small remaining gap is sealed with a further length of tape, applied longitudinally.

The *Denso Tape* retains its tacky qualities indefinitely, although the outer surface becomes less tacky after a short period of exposure. This prevents the attraction and retention of dust and dirt. The appearance is neat, but where an attractive finish is desired, the surface can be sealed and painted with ordinary types of paint or enamel. As the tape is available in widths from 1 in. to 32 in. in increments of 1 in., tape-wrapping can be carried out very quickly even on difficult pipe runs.

The non-setting characteristics of these protective materials were of value when, in the course of maintenance work, it became necessary to remove and replace one of the main valves adjacent to the brine circulating pumps, shown in Fig. 3. In the interests of cleanliness and appearance, the insulation had at this point been coated with aluminium paint, so that it was not possible to use the tape again, but the whole of the insulating cork and the Densoset paste/cork mixture was removed and replaced when the valve was refitted, none being wasted at all. In the illustration, the new valve has been wrapped with a new layer of tape and is ready for painting; the valve at the left shows the appearance of the completed job.

This company has in the past used the conventional bitumen method of protecting their refrigeration lines, but has found that, when extensions of modifications became necessary, much labour was wasted in chipping off the old insulation. This was usually so damaged in the process that it was unfit for further use. The adoption of petroleum jelly-based materials has resulted in a considerable saving in this respect. There is also a substantial economy in applying the insulation, because the materials are ready to use and can be applied cold. There is no need to maintain a pot of hot bitumen, and once the tape is applied, the job is finished. It has also been found that the non-setting character of the compounds eliminates the danger of cracking after exposure to varying temperatures, and the attendant danger of moisture penetration.

Fig. 4. Bedding the outer cork layer in Densoset. Cutouts and intricate corners are packed with Densofil, a mixture of paste and granulated cork. The cork sections are secured in place with galvanised wire.

The makers of Denso materials (Winn and Coales, Ltd.,) state that their compounds incorporate passivators and inhibitors which provide positive protection against corrosion of metal surfaces to which they are applied. Although the products described here are being used on an increasing scale for the protection of refrigerating systems, this is by no means the limit of their usefulness in the food processing industry. Other materials in the form of tapes, cords, paste and paper are available for a variety of purposes, including

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Autoxidised and Heated Fats as a Nutritional Hazard–2

By A. A. Newman, D.Sc., F.R.I.C.

In the second part of his article, Dr. Newman discusses the relationship between structure and toxicity, and the effects of industrial and domestic cooking.

V. TOXICITY AND STRUCTURE

It is an unfortunate fact that we know a good deal less about the toxicity and structure of the individual denaturation products in the physiologically more important autoxidised fats than about the properties of the corresponding substances arising from the process of thermal polymerisation. While it is important to remedy this situation, it would be wrong to underestimate the need for more investigations on the nature of thermal polymerisation itself as the range and amount of glycerides so processed is increasing. Further, one must not overlook the fact that during domestic cooking operations fats are often heated in covered receptacles, that is under conditions of relative oxygen scarcity.

Taking the two kinds of heated fats together, and recapitulating some of what has been said about them before, a list of the main types of toxic substances will be approximately as follows:

(*a*) Hydroperoxides.
(*b*) Polymeric bodies.
(*c*) Monomeric cyclic compounds.
(*d*) Monomeric straight-chain compounds.

Although the first two types are given separately, in practice they must be discussed together, if only for the reason that no experiments with authentic hydroperoxidised monomeric or polymerised triglycerides have yet been reported in the scientific literature. All our present knowledge regarding such bodies is compounded from the study of individual fatty acid hydroperoxides, and the physiological effect of fractions *mainly* composed of dimeric (or more highly polymeric) substances.

Hydroperoxides

With regard to individual hydroperoxides, Horgan and associates[33] have found that of a number of such compounds studied by them the linoleic ac-hydroperoxide was the most toxic, its L.D.$_{50}$ being in the range of 4-8 μ moles per mouse of average weight. This compares with 58 μ moles for tertiary-butyl-hydroperoxide, hitherto considered as one of the most toxic hydroperoxides known. Having regard to the fact that linoleic acid is almost invariably present in the types of fat studied here, the significance of this high toxicity must be duly considered.

A brief survey of the literature relating to the physiological action of fatty hydroperoxides yielded the following picture:

Fatty hydroperoxides are readily absorbed by the organism,[34] and soon after ingestion can be detected in such disparate parts of the body as the liver or the adipose tissue of the muscles.[35] Fatty hydroperoxides will attack vitamins,[36] inhibit certain enzymes,[37, 38] affect the mitochondria,[39] interfere with the function of cortisone,[40] reduce the viscosity of DNA,[41] attack hæmoglobins,[42] destroy vital -SH linkages,[43] and may exert mutagenic action.[44, 45, 46, 17]

The attack by these hydroperoxides is not necessarily direct. In the case of mitochondria, to quote one typical example, the damage is achieved by first oxidising the fatty material associated with the granules. A not unimportant consequence of the action of hydroperoxides on unsaturated glyceride components is the depletion of the body of its reserves of essential fatty acids.

A less specific effect of the consumption of peroxidised fats is the need for a higher caloric intake, particularly in the form of proteins.[40, 48, 49]

Thermally polymerised fats

From what has been said about the action of peroxidic groups, one would expect that the oxidative polymers will be more toxic than their counterparts produced in the absence of oxygen, and the only paper known to deal with this aspect[50] appears to support the assumption. As the physiological inocuousness of potassium-iodide treated (that is de-peroxidised) polymers shows the polymeric structure *per se* is not necessarily harmful.[26] The toxicity of thermally polymerised fats is therefore likely to be due to the cyclic nature of much of the material. The "intrapolymers" referred to earlier, on the other hand, are on the dividing line between the clearly toxic and non-toxic compounds. While they are not injurious to the living organisms, they will not sustain its growth.[51]

The opinion held by some workers[33] that polymers are not absorbed by the body appears to be based on imperfect evidence. The relevant literature is not lacking in experimental results demonstrating that dimers, at any rate, can be absorbed, and are capable of behaving as active toxic agents.[26, 48, 49, 52, 53] It is proper to add that most of the evidence pointing in this direction relates to oxidative polymers, while our knowledge concerning thermal dimers is less certain, and on occasion such information as is available is downright contradictory.[51, 54] Nevertheless, the fact

that fractions consisting of dimeric esters of heated oils were, at one time or other, found to be lethal[51, 55] is indicative of the possible damage resulting from the consumption of such fats.

The toxicity of the cyclic monomers formed within thermally polymerised fats was investigated by the Crampton group.[54, 55] They found that while these monomers were less deleterious than, say, hydroperoxides, yet they were sufficiently toxic to exert a noticeable growth-depressing effect even when present at the low level of 2·5% in the diet.

Straight-chain compounds

The physiological action of a number of straight-chain compounds has also been studied. Included in this group are: hydroxylated and epoxylated compounds,[52] conjugated fatty acids,[56] and lactones.[57] In moderately heated oils, the concentration of such compounds is not sufficient to become dangerous, but their potential toxicity should not be minimised. Thus conjugated compounds may inhibit the arachidonic synthesis, while certain lactones are known to have cytotoxic properties.

As with the fatty acids, the oxidation and thermal decomposition products of cholestrol can be harmful. Roffo (l.c.) and Waterman[58] went so far as to claim for them carcinogenic properties. Although this was contested by other workers,[59, 60, 61, 62] it is clear that the ingestion of cholestrol or cholestrol-derivatives heated to 300°C. or over can lead to serious pathological consequences, including the formation of lung abcesses[61] and spindle, or giant cell sarcomas.[63, 64]

Finally, reference must be made to the possible injuriousness of heat-denatured squalene, a compound of some physiological importance, present in rather small quantities in many unsaturated fats. According to Bolland and Hughes,[65] autoxidised squalene can yield both hydroperoxides and cyclic peroxides. Horgan and associates,[33] who have studied this compound, draw attention to the fact that the non-availability of squalene for cholestrol formation may have far more serious consequences than the action of the mildly toxic peroxides derived from it.

VI. OTHER FACTORS AFFECTING TOXICITY

In the previous section a good deal has been said about the toxicity of various types of compounds, but very little about the quantitative aspects of the subject. The reason for this is simple. The toxicity of a type of compound, or of a specific compound, will depend on a number of factors, and unless these are stated in some detail, any information relating to toxicity may be largely meaningless. It is, of course, axiomatic that the length of the heating period, the level of the temperature applied, or the amount of heated fat consumed, are vital factors. Less well known is the fact that the presence of certain catalysts may profoundly influence both the proportion of the denaturation products and their relative toxicities. A particularly interesting example, illustrating the point, is quoted by Chalmers.[66] A sample of cottonseed oil heated to 325°C. in the presence of iron became almost entirely unsaponifiable after a heating period of only 2½ hours. As many saucepans and frying-pans are made of iron, Chalmer's findings are of a definite practical importance.

The nature of the fat used, particularly the degree of unsaturation of the fatty acids involved, is another factor of consequence. Thus lard and cottonseed oil, heated under identical conditions, will not be affected in the same way. Not only will the latter fat yield on distillation a higher proportion of residue, but weight for weight the residue from cottonseed oil will be more toxic than that from lard.[7, 52, 67] From this it follows that it should be possible to classify the various types of food-fats in a hierarchical order of toxicity. And what applies to the fats as a whole will often apply to comparable *types* of toxic products extracted from such fats. For instance, the monomeric cyclic compounds from linseed oil will be more injurious to health than the corresponding compounds obtained from, say, soybean oil or sunflower-seed oil.[31, 18, 19]

The species of the test-animal, or even the particular strain used, or the route (e.g., oral or parenteral) by which the toxic substance reaches the organism, may all have an influence on the final result. The composition of a diet, in which the fat is incorporated, is of similar importance. As already mentioned, a high proportion of proteins may counteract the harmful effects of many peroxidised fats,[49] while the presence of some fresh fat will offset the toxicity of the heat-damaged portion.[49, 67, 68] It is significant, however, that the degree of protection afforded by such means will be less complete with some fats than with others.[67]

VII. THE EFFECT OF DOMESTIC AND INDUSTRIAL HANDLING ON FATS

Having regard to the results of the laboratory experiments described earlier, one feels compelled to examine the question as to what extent the domestic and industrial handling of edible fats will promote the formation of pathological lesions in the human organisms, and more particularly in the gastric region.

Domestic cooking

As far back as 1941, two eminent cancerologists concerned with the same problem felt justified in concluding that domestic cooking must be considered as a contributory factor. This applies with particular force to the frying of meats, fish and other foodstuffs, routine operations in most households, often involving the use of pans or receptacles of unenamelled iron. From numerous reports published in the clinical press it emerges that at temperatures over 230°C., or more cautiously between 250-300°C.,[6, 69] the formation of toxic substances in fats reaches a critical level. Now ex-

periments executed in the early forties by Kirby and others[6, 61, 70] have shown that temperatures exceeding 280°C. will often be attained on the surface of frying meats, and Peacock, Beck and Chalmers[1] have even observed that when frying is vigorous, a lead-pellet placed in the pan can be made to melt, denoting a temperature of 327°C. or over. If this can happen in the laboratory, it can also happen in the family kitchen. Bearing in mind the—cumulatively—vast scale on which domestic food preparation is carried on, its possible influence on the promotion of cancer, or other pathological lesions, is a matter deserving serious consideration. In this connection one may also remember the findings of Widmark[7, 52, 67] that in the course of some experiments 9 female mice, out of 24, painted with a solution of "browned" butter, or fats extracted from fried meats, or roast coffee, developed malignant tumours. Although the cancerous nature of these tumours is open to some doubt, it seems incontrovertible that such comparatively humdrum foods can cause pathological lesions of a serious nature. Incidentally, Widmark's work was later partly confirmed by Steiner, Steele and Koch,[71] who injected a similar fat extract from fried meats and obtained, after 14 days, a large sarcoma on the site of the injection.

The widespread popularity of shop-bought "fish and chips," coupled with the current trend towards the industrial preparation of such deep-fried foods as potato-crisps and doughnuts and also baked goods rich in fats, may carry implications beyond palatability, or caloric value, and enhance the urgency of the last-named authors' warning that "an extensive study of the carcinogenicity of various heated fats is imperative." What applies to vegetable fats also applies to those of animal origin.

Baking

There is a certain amount of literature dealing with danger in the chemical constitution of fats during baking and frying, but not enough to cover the field adequately. According to Chang, Tchen and Watts,[72] baking will not affect the wholesomeness of lard incorporated in a dough, or denature such essential fatty acids as may be present therein. Similarly, Crampton and his associates[73] have found that when thermally polymerised linseed oil was used as shortening, no further deteriorations in the growth-sustaining power of the original fat took place. The mildness of the baking process is further confirmed through the observation that practically identical results could be obtained in either the presence or absence of autoxidants.[73, 74]

Frying

The picture is somewhat more blurred when it comes to frying. The Kaunitz group,[48, 49] which experimented with a variety of fats, found that polymers were formed (in one case amounting to some 7%) and that such fats, while not noticeably toxic, tended to cause renal and hepatic enlargement. Lloyd A. Witting[75] found that commercially used frying fats afforded lower growth-rates than the corresponding fresh oils. In contrast with the previous workers, Chalmers[66] and Melnick[76] could observe only slight chemical changes and virtually no polymerisation in frying used under practical conditions. At this point one must make clear that the conclusions of these two authors rest on the doubtful assumption that the absence of detectable polymers is a sufficient criterion to absolve a heated fat from all suspicion of deleteriousness. In fact, the absence, or scarcity, of polymers may be due to secondary depolymerisation following the addition of fresh fat. As, however, Kaunitz[67] has shown, with some fats (e.g., cottonseed oil) depolymerisation will reduce but not abolish toxicity. Much the same consideration applies to lard, although, in this case, any residual toxicity may be too weak to be easily noticeable.

The need to ascertain the presence of even weakly active toxic agents is a very real one. There is a fair amount of evidence to prove that when such substances are allowed to act for a sufficiently long period, they may in the end produce dangerous lesions.[18, 66, 70, 77, 78] Even when the concentration of toxic agents is relatively substantial, a long latent period will be the rule rather than the exception. With rats and mice, the most frequently used test animals, this may extend from 12-30 months.[1, 13, 14, 15, 63] Bearing this in mind, the experimental period of 10 weeks adopted by Deuel and co-workers[79] for feeding his animals with fried chips can scarcely be considered as adequate.

In this connection one must also remember that organoleptic tests do not constitute a reliable guide as to the condition of a given fat. As far back as 1932, Whipple[3] reported that in some fats the presence of peroxides in injurious quantities was practically undetectable. In a similar vein, Crampton and his associates[31, 80] have observed that a highly deleterious NAFD-fraction from linseed oil was entirely bland in taste, while Bennon and Hanning[81] could not distinguish between baked goods prepared with fresh and autoxidised fats respectively. Obviously, the problem of baked and fried foods cannot be easily disposed of.

It is highly desirable that changes in the chemical composition of various frying oils should be further studied, the proportion of the individual degradation products noted, and their relative toxicities established over an experimental period as long as the natural life-span of the test-animals will permit.

Irradiation

This chapter cannot be closed without some reference to health-hazards that may arise from the application of sterilising radiations to fatty foodstuffs. From the study of some recent papers[76, 82] it appears almost certain that such processing will have consequences closely approximating those of autoxidised and overheated fats.

This is to be expected, as the chief effect of irradiating fats is the formation of fatty peroxides, followed by the now familiar reaction-sequence of polymerisation, and partial decomposition.

VIII. SUMMARY

The experimental results described in the earlier sections have shown that the introduction of autoxidised and thermally affected fats into the organisms of test-animals can produce pathological lesions ranging, according to conditions, from benign papillomas in the forestomach to malign neoplastic growths in the glandular region. While it must be emphasised that none of the latter type of lesions so far produced have satisfied the rigorous conditions of true carcinogenicity, in several instances the difference was not wide from a practical viewpoint.

It may be useful at this juncture to reiterate two points discussed before. The first one is that, as far as resistance to toxic agents is concerned, the behaviour of the rodent-rumen appears to be nearer to that of the human stomach than the anatomically more closely related glandular zone. The second point concerns the significance of small amounts of weakly active toxic agents. Such substances can act either directly, or, what is no less important, as sensitisers of certain carcinogens (including benzpyrene) that may have found their way into the body from other sources.[83] Some additional support for the theory that there may exist a connection between the presence of autoxidised fats, and cancer-formation in the human body, can be derived from the well-authenticated observation that a sustainedly high consumption of *intact* fats will produce more malignant tumours than a diet comparatively poor in glycerides.[84, 85]

In the light of what had been said earlier, one may feel justified to draw the following conclusions:

(1) The domestic and industrial handling of fats may lead to significant changes in their chemical constitution.

(2) The ingestions of such denatured fats may lead to a variety of gastric lesions, some of a pronouncedly malign nature.

(3) There is a good deal of presumptive evidence in favour of a link between the consumption of autoxidised and overheated fats and human gastric cancer.

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▶A recent edition of *Merchandising Vision*, published by British Cellophane, Ltd., devotes its leading article to the manner in which quick-frozen foods are changing the eating habits of the world. The part played by transparent film packaging, which has been used since the infancy of the quick-frozen food industry, is also described.

The Indian kitchen, part of the International Kitchen exhibit staged by the Gas Council, looked almost too elegant for cooking, but produced a succession of attractive national dishes.

The Wealth of Nations

Displayed at the British Food Fair

AS an exhibition of the food available in this country from all parts of the world, the 1958 British Food Fair can rarely if ever have been exceeded. In a hall brightened admirably by the imagination of the organisers, there was on display an almost confusing abundance of agricultural produce from every continent, processed and packaged and titillatingly presented for the delectation of the British housewife and her spouse.

It is not to decry the standard and interest of the British exhibits to say immediately that one of the outstanding features of this year's fair has been the successful response to the invitation to participate sent out to overseas government and agencies. Not only were there excellent exhibits from several Commonwealth countries, but the U.S.A., France, and several countries from behind the iron curtain presented a lavish display of their products. Indeed, if this determined attack on our palates is to be taken as indicative, the so-called "iron curtain" is rapidly becoming permeable to food and drink.

British produce

It is clearly impossible in an article of this type to give anything approaching a comprehensive review of the many exhibits on view; one can hope at the best to give an indication of some of the many points of interest. One such, among this wealth of foreign products, was the Home Produce exhibit. Developed around the idea that today it is essential not only to grow food efficiently, but also to market it efficiently, this exhibit demonstrated the activities of six organisations closely concerned with this aspect. These are the N.F.U. Market Produce Show Society, Ltd., the National Milk Publicity Council, the Potato Marketing Board, the Tomato and Cucumber Marketing Board, the English Country Cheese Council, and the British Egg Marketing Board. The best that British producers can do in the preparation and packaging of fresh vegetables was displayed, and modern methods of growing, harvesting and marketing were illustrated. Milk there was in abundance, in its natural state and in many different forms, in the milk bar; an exhibit showed the work of an egg grading and packing station; and the English Country Cheese Council continued its yeoman work in the popularising of the many local forms of native cheese. Specially featured on this occasion was Sage Lancashire, a cheese which can be little known outside that county, but which certainly merits a wider public.

Cheese was also prominently featured on several other stands, notably those of Wilts United Dairies, Ltd., who exhibited Stilton cheese of prime quality, and their new English cheese spread, and of Kraft Foods, whose Cracker Barrel packs were prominently on display. Kraft also exhibited and sold their new *Cheez Whiz*, a creamy cheese spread flavoured with Worcester sauce.

Exotic atmosphere

In general, the ground floor at the fair was given over to British exhibits, the stands of overseas countries being gathered together on the balcony. Even on the ground floor, however, a distinctly exotic atmosphere crept in, due in no small measure to the im-

pressive exhibit of the Gas Council, the International Kitchen. This consisted of 12 separate kitchens, decorated in the style of twelve different countries, in which cooks from those countries, dressed in National costume, prepared a selection of their native dishes. The kitchens were identical in design, but the effects achieved, both decorative and gastronomic, were intriguingly different, and the stand undoubtedly contributed much to the general international atmosphere of the fair.

An exotic air was also introduced by the stand of Lamet (Distributors), Ltd., on which Chinese girls in native costume formed a pleasing background to an array of Chinese delicacies including attractive jars of ginger, Pekin ducks, jasmin tea, and a host of other commodities too numerous to list.

The stand of the Corporation of Argentine Meat Products, on which were displayed meat and fruit products from Argentina.

Meat products

For palates less inclined to wander from the well-tried paths, but still demonstrating the many foods reaching us from overseas, the Corporation of Argentine Meat Products (C.A.P.), Ltd., put on a show of robust-looking meats. As well as fresh cuts, corned beef and extremely attractive packs of brisket beef and ox tongues were displayed. Less expectedly, the stand also showed what Argentina is now sending us in the way of canned fruit, and the peaches, apricots and pears on display bore witness to the high quality now being achieved in this branch of food production.

English meats there were too, and the stand of Marsh and Baxter was an impressive demonstration of the fact that, notwithstanding the fierce competition they are having to face from Danish and Polish producers, British manufacturers can still cure bacon and hams as fine as any in the world.

Commonwealth countries

As was mentioned above, the balcony was largely given over to stands of exhibitors from overseas. Of the Commonwealth countries, the Governments of Australia, New Zealand and South Africa were large-scale exhibitors. Each showed an abundance of its country's produce, with not a little emphasis on the *vin du pays*. Indeed, the Australian stand carried this emphasis to the extent of offering free tastings of Australian wines, a notably popular feature of the exhibit. On all three stands, a remarkably successful effect of warmth and sunniness was achieved, and this went a considerable way to enhance the appeal of the actual foods on view.

A typical English stand, that of Kraft Foods, Ltd.

American exhibit

In the United States exhibit, an attempt was made to indicate the great diversity of American agriculture, and at the same time to illustrate some of the factors which are influencing food production in America today. Fresh fruits of several varieties, including citrus fruits, demonstrated the size and quality which the American growers are now achieving, and other sections of the exhibit showed the value which is now being attached by American housewives to easily prepared foods. Tinned, poultry, packaged cake mixes, concentrated fruit juices and precooked frozen foods are none of them new to this country, but the abundance of varieties displayed on the American stand emphasised that these commodities are still virtually in their infancy on this side of the Atlantic. The space devoted to extolling the virtues of American lard showed too that meat processors in this country are not alone in their search for eco-

Left: **A display of dried fruits, canned fruit, deciduous fruits, and citrus fruits which formed part of the U.S. exhibit.**

Below: **The Polish Stand, on which the agencies Animex and Rolimplex demonstrated their respective ranges of animal and vegetable products.**

nomic channels of disposal for surplus hog fat.

Eastern Europe

And so to the iron curtain, and the many foods and drinks which are now penetrating it. Poland, Czechoslovakia, Hungary, Bulgaria, and Yugoslavia were all officially represented by government agencies, and these countries are obviously determined to make a serious effort to popularise their local food products with British housewives; and their drinks with British husbands, judging by the displays of vodka and other Slavonic drinks. Some of these stands were in conception and lay-out undoubtedly amongst the most striking and attractive to be seen at the fair, although the labelling and general finish on many of the packaged goods seemed somewhat inferior by our standards. None the less, the representatives on stands reported that many enquiries or firm orders had been received, and seemed well-pleased with the results of their exhibits. Many of the foods and drinks on show are never likely to be competitive on a large scale with the products of British manufacturers, and against the background of increased East-West trade which is now being fostered on all sides, it is encouraging to see the British Food Fair helping to stimulate these commercial exchanges, and subserving more and more the function of being a shop window not only for British foods, but for the foodstuffs of all the world.

Insulating Refrigerant Pipelines

(*Concluded from page 421*)

the insulation of heating plant and the protection of steelwork exposed to corrosive influences. Sealing compounds and mastics, unaffected by temperatures between −50°F. and 250°F., are used for making gas-tight joints in ducts and for sealing manhole covers. The high electrical insulating properties of these products also render them suitable for work on electrical installations, such as the sealing of junction boxes. Other materials are employed to seal glazing bars, where their ability to withstand all weathers without cracking or flowing gives them an indefinite life.

Although the installation at the Brazil works is too recent to gauge the durability of the new materials used, their thermal properties are excellent. Despite the long distance over which the refrigerant is piped, there is a temperature rise of only 8°F. between the supply and return pipes on the main pumps. The reduction in power required to re-cool the brine, as compared with previous consumption, is expected to result in savings which will pay in a short time for the cost of the materials and labour used to renew the insulation.

Computing machines are now being used increasingly throughout industry and commerce. In the latest edition of *The Tabulator*, published by the Hollerith group of companies, many useful examples are given of the application of these labour-saving appliances.

Advances in Food Technology

SAUSAGE PRODUCTS

Starch Decomposition

Farinaceous products such as potato flour are normally added to sausage products as binders. The decomposition of starch was studied in a series of experiments on 38 different products. It was found that while fresh sausages showed little or no change, even after storage, in their starch content, the latter was markedly reduced during cooking. This effect is attributed to gelatinisation of the starch. The further action of amylase is suspected but not proved. —O. Dahl, *Food Research*, 1958, **23**

POTATOES

Comparison of Storage Methods

The clamp and barn storage methods of potatoes intended for processing were compared experimentally. It was found that potatoes stored in a building with restricted ventilation so that the temperatures did not fall below 7°C. had a lower content of reducing sugar than did those stored in clamps. This is advantageous to processors, since a high content of reducing sugar is detrimental to the colour and storage life of crisps, chips, and dehydrated potatoes; particularly the last under tropical conditions. The increased loss in weight in indoor storage was substantially due only to loss of water. If storage is for too long a period or at too high a temperature, a sprout depressant is necessary. Maleic hydrazide and "TCNB" are recommended.—E. G. B. Gooding and C. G. Tucker, *J.Sci. Food Agric.* 1958, **9** (7), 448.

PACKAGING FILMS

Effects of Radiation

The degradation of the physical properties of polymers by high energy radiation is well known. Experiments were conducted to ascertain the importance of this effect in films used as food packaging materials when the food is sterilised by radiation. The materials tested were "Mylar polyester," polystyrene, cellulose acetate, cellophane, and vinylidene co-polymers.

At the sterilisation exposure level all the films were essentially unaffected, and there should be no observable changes at the lower exposure levels used for de-infestation and lengthening the shelf life. Any of the above plastics may therefore be used in packaging food which is to be sterilised by irradiation after packaging.—H. G. LeClair and W. H. Lobbs, *Industrial and Engineering Chemistry*, 1958, **50** (3), 323.

FOOD ADDITIVES

Milk Protein Solids

The principal proteins of milk, casein, lactalbumen, and β-lactoglobulin are separated from skim milk and converted into granular or powdered forms, for various purposes, enumerated as dietary supplements, direct aids to production, "quality boosters," and adjuncts. The high percentages of essential amino-acids in the proteins, *e.g.* 8.8% lysine, are emphasised.

The proteins are obtained by heating and acidifying the skim milk, the curd then being treated according to the particular product required, granular or powdered. If granular, the curd is tunnel-dried at 160°F. until the moisture content is less than 4%. It is then ground, screened and packaged. Powders are prepared by heating the curd in an open stainless steel vat, with high speed stirring and treatment with alkali, after which the protein content is adjusted as required by adding milk solids other than fats. The product is then dried in a spray drier. The resulting powder, of less than 5% moisture content, is screened and packaged.—J. V. Ziemba, *Food Engineering*, 1958, **30** (7), 78.

PACKAGED BEEF

Retention of Red Colour

In pre-packaging meat for self-service sale, colour retention has been a problem in distribution. The usual practice is to enclose the meat in a packaging film which is permeable to oxygen but semi-permeable to moisture, coated on one side with a moisture resistant material. Under these conditions, the red colour is lost, and becomes predominantly brown, and the meat becomes unacceptable to many purchasers. The change is attributed to various reactions between atmospheric oxygen and the pigments myoglobin and oxymyoglobin, both red, and metmyoglobin, which is brown. The colour loss occurs in about 48 hr.

As a result of experiments, the authors propose a technique which practically amounts to a reversal of the conventional one. They report that fresh meat packed under vacuum loses its red colour rapidly, but, after a time, 2 weeks or longer, the colour returns. This recovery is accelerated by increasing the space in the cans occupied by the meat until it is at least 90%, when, with high vacuum, the red colour returns after 2-4 days. Further, in film packaging, the best colour retention was obtained with a polythylene film coated with polyvinyl alcohol.—R. W. Dean and C. O. Ball, *Journal of Agricultural and Food Chemistry*, 1958, **6** (6), 468.

Improving Nutritive Value

(*Concluded from page* 419)

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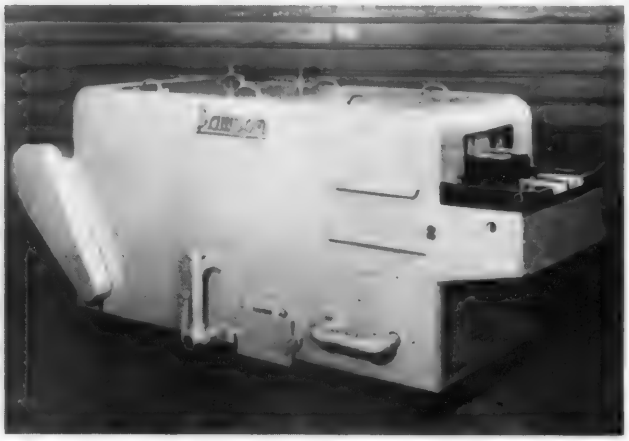
Machinery and Equipment



The new Dawson washing and rinsing machine for capped (metallic closure) jars is available in several sizes.

WASHING AND RINSING MACHINE

A new machine for washing and rinsing filled and capped (metallic closure) jars is being made by Dawson Bros., Ltd. It is available in various sizes to suit any size of production line.

In the model capable of dealing with 80 1 lb. jars per min., feed is by automatic conveyor from the capping machine. A plough arrangement divides the line of jars into 2 lanes, after which they travel through the cleaning operation on a continuously moving wire conveyor belt.

The wash is at 145°F. through high pressure jets which remove any surplus jam, etc., from the surface of the jars. A final rinse with water at 180°F. leaves the jars spotless and the heat dries the jars soon after they emerge from the machine.

A model for hand feed and discharge is also available.

STAINLESS STEEL WATER-BATHS

Smooth finish stainless steel is now being used by A. Gallenkamp and Co., Ltd., in the construction of their range of water baths. Two general purpose baths and the bath for Soxhlet extractions have already been modified although they retain their original dimensions and shape.

The baths are heated by tubular immersion elements and each bath is equipped with a safety head to protect the element should the water be allowed to evaporate. The temperature of the Soxhlet apparatus is controlled by a 3-heat switch for A.C. and D.C. supplies or an energy regulator for A.C. operation only.

The general purpose baths have six or twelve holes, 3¼ in. diameter in the top cover, each hole being fitted with a set of stainless steel rings. An energy regulator is available for use on A.C. supplies. The Soxhlet bath is suitable for six assemblies of glassware and takes flasks up to 500 ml. capacity; condensers are held by spring clips fitted to an adjustable horizontal rod carried by two vertical 24 in. duralumin rods.

DRUM CLEANING EQUIPMENT

The cost may be lowered and the rate of drum reclamation increased, it is claimed, by making use of the drum cleaning equipment made by Allen Harrison and Co., Ltd.

The firm say that there are a number of features which must be incorporated in drum cleaning equipment if operation is to be successful. The layout and construction of the drum washer must be simple to allow materials to be used which are resistant to acid and corrosives. The cleansing jet must be able rapidly to remove heavy substances, covering all affected surfaces with a fantailed spray. A 2 min. period of washing is stated to be necessary since a shorter time would be unsatisfactory in many cases. A degree of flexibility is required to meet adequately the varying drum input of the user.

The plant made by the firm, which ranges from a single unit integral washer handling 30 drums per hr. to a 4 station internal and external drum washer also handling 30 drums per hr., is claimed to have all these features.

PACKAGE BOILER

Long life, low maintenance costs and high efficiencies over the boiler's modulating burning range are among the claims made for the *Multipac* package unit boiler made by the John Thompson Group. Continuous testing of the boiler over the past few months is stated to have shown that a thermal efficiency of 82% is readily available.

Among the features of this equipment is the built-in wet back combustion chamber which, it is stated, provides adequate volume giving a very high degree of flexibility and eliminating entirely the need for refractory linings.

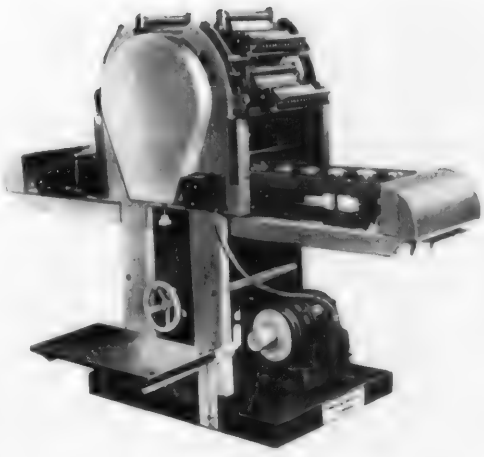
The boiler is available in 11 different sizes ranging from 2,500 to 10,500 lb. per hr. evaporation capacity.

LEVEL CONTROLLER

An inexpensive level controller has been introduced by Fielden Electronics, Ltd., who say that device is not merely a proximity switch but is a level controller designed to work accurately and consistently with virtually no attention.

The instrument, the *Tektor Minor*, incorporates many features of the

A thermal efficiency of 82% is claimed for the Multipac boiler, a package unit made by the John Thompson Group.



The Dawson Multi-Colour Paperless Labeller, which can print a 4-colour label direct on to a container in one operation. Bottles, jars and cans with a capacity up to 1 gal. can be accommodated.

higher priced *Major*. It has adjustable, calibrated, set-point control and a triggered, positive relay action. Installation is simplified by a quick-release chassis. Good stability is claimed for the instrument, which has a sensitivity better than 2·0pF. under all conditions.

The instrument, which weighs 6 lb., is housed in a die cast aluminium or sheet metal weatherproof case with a hammer grey finish.

MULTI-COLOUR PAPERLESS LABELLER

A new machine designed for printing labels on to cylindrical containers has just been introduced by Dawson Bros., Ltd. It is a patented fully automatic rotary machine known as the *Dawson Multi-Colour Paperless Labeller* and it is capable of printing up to a 4-colour label direct on to a container in one operation.

Bottles, jars, cans and similar containers, up to 1 gal. sizes, may be given a body label which cannot tear off like a paper label nor fall off at a low temperature. The makers claim that the machine is inexpensive to operate when compared with other methods of labelling, may be speedily changed from labelling one size of container to another and, by eliminating paper or adhesive, simplifies the washing of the container.

A machine is available which prints up to 2 colours only.

QUICK-FREEZING EQUIPMENT

Jackstone Froster, Ltd., have announced that in addition to their present range of quick-freezing equipment they are now producing a *Jackstone Model A* double contact multi-plate quick-freezing cabinet. This cabinet, which contains from 7 to 20 stations, is suitable for operation with freon, ammonia or brine. It is also suitable for installation on land or in ships.

Jackstone freezers are of American origin and have been produced in this country since 1947. While all the other models made by the firm have been self-contained and fully mobile, the *Model A* cabinets are designed for operation from detached refrigeration units and are stated to be ideally suited for connection to low temperature cold store plant.

INDICATING CONTROLLER

A new air operated indicator controller, known as the *M/41A*, was introduced recently by Foxboro-Yoxall, Ltd. It is stated that this instrument provides on/off or proportional action for pressure, temperature, relative humidity or open tank liquid level applications. It is also made as a pneumatic receiver for 3-15 p.s.i. signals.

The makers claim that the instrument is economical in size and cost, and that it offers for simple applications a performance equal to that of more costly and flexible instruments. Standard components are used and it is mounted in a dust- and moisture-proof aluminium case. The control unit provides on/off action to an eighth of 1% on the scale range. The pneumatic proportioning mechanism is fully adjustable from ¼% to 25% of the scale.

HANDLING EQUIPMENT

Several pieces of equipment for the handling of drums and crates have been introduced to the British market by Conveyancer Fork Trucks, Ltd.

The first of these is a skid truck which may be used for transporting heavy loads without the aid of pallets or stillages. Using this truck 1 man can lift up to 1,763 lb. The truck runs on steel sliding rollers with bronze bearings, the support roller for the load being steel spindles with SKF ball bearings.

A lifting appliance in the same range, known as the *Drumtruck*, is designed for lifting liquid containers such as barrels, drums, tubs, etc., either open or closed, and has a maximum capacity of 1,102 lb. It may be used for diameters of between 18¾ and 26¾ in. and heights of between 25½ and 39 in. The drumtruck is pressure greased and all parts are galvanised. It is 47½ in. long and 33½ in. wide.

The third piece of equipment is a hand truck which may be used for carrying any cases, barrels and drums. A clamp is used to hold the load in position.

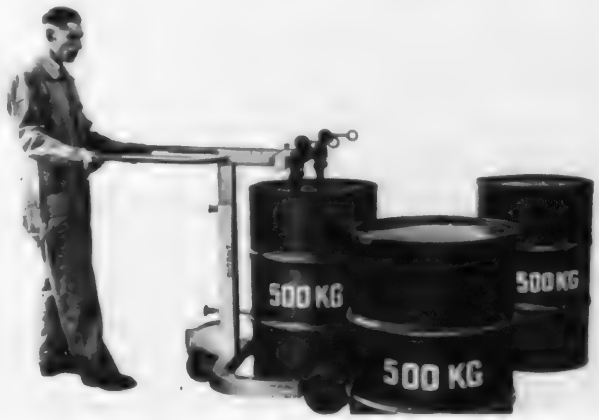
CAN SEAMING MACHINE

Cans of all shapes which are in general use in the food industry may be doubled seamed on a fully automatic seamer which has just been introduced into this country by Spanish and United Kingdom Merchants, Ltd.

The machine, the *Somme 312 LT*, has a patented seaming head which is said to be both well-balanced and compact. Four seaming rolls are provided, 2 first and 2 second operation. All the gears of the machine are helicoidal. There is a grease pump in the lower part of the machine which supplies lubrication to all parts.

The machine, which is powered by a 2 h.p. motor, can produce up to 20,000 cans per 8 hr. according to the type of can. The seaming tools used may be changed in a short time.

Electric lighting and a can counter can be fitted to the machine if required.



The Drumtruck, made by Conveyancer Fork Trucks, Ltd., is designed to facilitate the handling of barrels and drums.

POLYTHENE CONTAINERS

A dustbin-size polythene container is the latest addition to a range of large moulded bins, tubs and boxes recently introduced by White, Child and Beney, Ltd.

It is a 15 gal. bin, with a lid, which is claimed to permit secure stacking and a good seal. It measures 18 in. diameter at the mouth by 23½ in. deep and is available in standard grade polythene, natural colour, ex stock, or in high density material to special order. The latter quality is recommended for carrying or storing fatty substances, or for temperatures around boiling point.

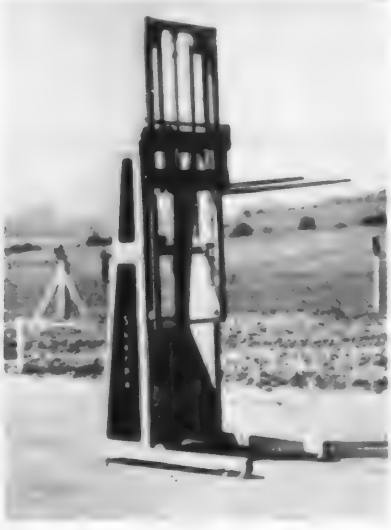
A 50-gal. container is in preparation, and several other bins, boxes and trays are shown on an illustrated sheet now available from the firm.

TELESCOPE STACKER

Salisbury Precision Engineering, Ltd., have introduced Model VIII in their range of *Sherpa* telescopic stackers. It is capable of lifting 7 cwt. at 15 in. load centre and is available in 2 sizes. The first of these, the *VIIIA*, has a 9 ft. lift and stands 6 ft. 4 in. high when collapsed, while the second, the *VIIIB*, lifts to 12 ft. and has a collapsed height of 8 ft.

Either of these is available as a battery or mains operated truck. Battery trucks incorporate a charging socket, and a special *Westalite* charger can be supplied to suit the battery used.

The telescopic frame is constructed from angled mild steel and is mounted on needle roller bearings. The framework is rigidly constructed and tested with a 50% overload. Needle roller bearings are fitted to the 4 in. dia. tandem front rollers and 6 in. dia. rear castors. Two high tensile steel roller chains give absolute security of the load and a factor of safety of 8:1.



The Sherpa telescopic stacker, a new model by Salisbury Precision Engineering, Ltd.

A 15-gal. polythene bin, now available in standard or high-density material.

REACH TRUCK

A reach truck capable of handling a 2 ton load was recently introduced by Lansing Bagnall, Ltd., who claim that this is the first reach truck to have such a capacity.

With a load measuring 48 in. × 48 in. the new truck can operate in gangways only 90 in. in width for right-angled stacking.

Attention has been drawn to the driver position—in this machine he operates in a seated attitude across the chassis and the line of drive. It was concluded from development trials that this position is preferable since it gives the driver a much better factor of visibility, especially when driving in reverse.

The truck has a tilting mast and can lift at a speed of 45 ft. per min. Travel speed is 5 miles per hr. and hydraulic brakes are fitted to the front load wheels. This new truck styled model *FRER2*, also incorporates regenerative/rheostatic braking. This means that when decelerating or descending a gradient the drive motor functions as a generator and feeds energy back to the batteries. Yet a further feature is the ability of this truck to unload its own batteries—an operation which can be completed in about 2 min.

ORANGE CONVERTER

A machine which can produce a variety of concentrations of orange drink, ranging from a ready-to-drink type breakfast juice up to concentrates which may be diluted 15 times before consumption, is now being marketed by Clarke-Built, Ltd.

The capacity of the machine, which is known as the *N.D. Orange Convertor*, varies with the concentration of the product; at normal squash concentrations, approx. 100 gal. per hr. can be produced.

Washed fruit is passed through a high speed stainless-steel saw and then delivered to an inspection table where the halves are fed through a chute. The halves then pass through rollers, where the pulp is reamed out and the skin is split and flattened out. The volatile oils are absorbed by a stream of sugar syrup. The skins together with the extracted juices are collected in a strainer submerged in sugar syrup.

The fruit-cutting unit is powered by a ¼ h.p. motor, while the actual machine is powered by a 1 h.p. motor. A ½ h.p. motor drives a pump discharging the product.

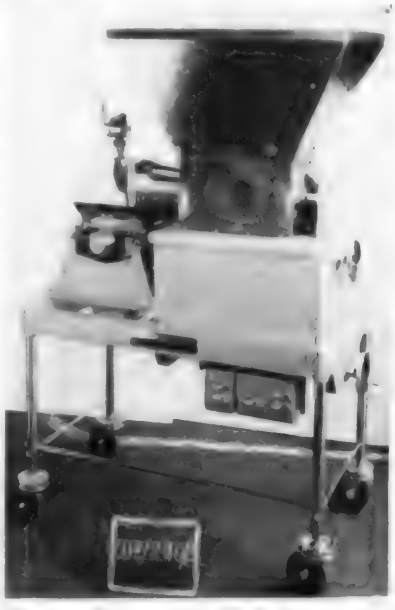
All parts likely to come into contact with the product are made either of stainless steel or of copper-free aluminium alloy.

COMMINUTING MILL

Whole onions and other vegetables for purees, baby foods, etc., are among the foods which may be comminuted in a mill recently introduced by Apex Construction, Ltd.

This new mill, the *No. 114 type F*, which has an output of 2,000/3,000 lb. per hr., is driven through V-belts from a 7½ h.p. motor. Three speeds are standard in the machine. It has a 6 in. power driven screw feed, the mechanism of which is mounted on a handwheel-operated moveable plate at the rear of the machine. The size of the product can be controlled by changing the screen, the blade face, and the speed. The grinding chamber can be removed in a matter of a few seconds and the whole machine can be rapidly dismantled without tools. It is constructed in stainless steel.

Complete equipment for the comminution of fruits to make fruit squash, including separation equipment and sieving machinery can be provided in conjunction with the mill.



The new comminuting mill by Apex Construction, Ltd., has an output of 2,000 to 3,000 lb. per hr.

News Digest

Wall's New Welfare Block

PLANS for Wall's new Welfare Block, believed to be the largest of its kind in Europe, were formulated in the post war years when it was realised that the Wall's meat products business was destined to expand considerably. Since the war the Wall's meat products companies have greatly enlarged their factory in Atlas Road, Willesden, and have built or acquired factories in Isleworth, Middlesex; Hayes, Middlesex; and Godley, Hyde, Cheshire.

Work on the welfare block, which was designed for the enjoyment of the Atlas Road employees, who now number 3,400, began in November 1956. It was opened on September 16.

The ground floor of the canteen block is given over almost entirely to kitchens, but it contains also a conference room, weighbridge office and a factory shop, where employees can buy Wall's and Unilever products.

An elegant staircase leads to directors', managers', and staff dining rooms on the first floor and employees' canteens on the second and third floors. Each of the canteens is 4,000 sq. ft., and each has its own servery and tea bar, served by a lift with electrically heated trolleys bringing food from the ground floor kitchens.

Part of the lower-level large canteen is wallpapered with a pattern of vertical bamboo—yellow and pale brown on an off-white background. The central supporting columns are painted a soft grenadine red and are faced with polished black bean strips. Lighting is by fluorescent fittings and the canteen is wired to take microphones and loud-speakers so that the entire hall can be converted to entertainment uses.

Part of the upper-level canteen is wallpapered in red with a gay wine-bottle design in white, green and black. The floor is of black polyvinyl chloride tiles with a pattern of red and yellow squares. The columns within the canteen itself are similar to those on the floor below but are painted yellow.

Catering is in the hands of Peter Marchant, Ltd., who will be operating a 24 hr. service. Arrangements have been made to ensure that the entire staff of more than 3,400 men and women can be served with tea during the 10-minute tea-breaks each morning and afternoon.

Another part of the building contains a modern medical department, cloakrooms, linen and other stores, plant room and rest rooms. The medical department is staffed by a resident medical officer, a sister in charge, a sister and five assistant nurses. One of the nurses is responsible for welfare visiting.

In view of the many different nationalities of Wall's employees, the services of an interpreter, who speaks English, Turkish, Greek, Polish, Czech, Slovak, Yugoslav and German, are available both as interpreter and medical orderly. He states that in his two years at Wall's he has needed to use all the languages he speaks.

The new medical section consists of a large surgery, an electrical therapy room, eye room, emergency casualty room, chiropody room, welfare room, two examination rooms, two rest rooms, a waiting area, medical officer's office, sister's office and nurses' quarters equipped with hot showers. Decor throughout this department is in cheerful colours—mainly yellows, blues, greens and reds—and tiles have a browny tartan pattern on a pearl-grey background, giving an overall pinky effect. The surgery has a primrose yellow ceiling.

A 12-storey ablutions tower has also been provided as part of the new welfare facilities. Total cost of the block has been £317,000.

Food technology

Prospectuses have been published by the National College of Food Technology which give full details of the national and regional courses being held in the session 1958-59. Copies may be obtained from the Registrar, National College of Food Technology, Cranwood Street, City Road, London, E.C.1.

Bakery education

The National Board for Bakery Education has published a list of the technical colleges throughout the country which are holding classes in bread-making and flour confectionery. The Joint Scholarship Panel of the baking industry has published a full list of awards and donors of scholarships. The total amount awarded in scholarships this year is £2,860.

Change of address

The Pig Industry Development Authority has moved to P I D A House, Ridgmount Street, London, W.C.1. Tel.: Langham 9174.

Copper in foods

The Minister of Agriculture, Fisheries and Food, the Minister of Health and the Secretary of State for Scotland have considered the revised Report of the Food Standards Committee on Copper, published in February, 1956, and the representations subsequently received from the interests concerned. They accept the view of the Committee that the consumer will be adequately protected if limits for the copper content of foods which are consistent with good commercial practice are observed and that, in the absence of any new developments, it is unnecessary to give statutory effect to the recommended limits. They do not therefore propose to make any regulations under the Food and Drug Acts prescribing these limits; the provisions relating to copper in the Food Standards (Edible Gelatin) Order, 1951 and the Food Standards (Tomato Ketchup) (Amendment) Regulations, 1956 will however be retained.

Sub-zero cold store

A new sub-zero cold store has been erected in Sandyland, Wisbech, adjacent to the main factory of Berridge and Mason, Ltd. The firm have formed a subsidiary company, known as B. and M. Foods, Ltd., to operate the new store, which will be incorporated in the general processing and freezing work of the parent company.

The present capacity of the store is in the region of 20,000 cu. ft. and at the moment it can accommodate about 150 tons of produce, although it is hoped that eventually these figures will be more than doubled. One of the main uses of the new store will be to conduct experiments aimed at keeping fruit by refrigeration in a suitable condition for canning.

The store is equipped with V block-type compressors driven by English Electric 7½ h.p. slip-ring motors, which give a temperature of −15°F. Both freezing and defrosting are carried out automatically.

Confectionery factory approved

The Secretary of State for Scotland has approved the Inverness bakery project at Longman Industrial Estate, Inverness, opposed by local bakery firms. The new factory will manufacture confectionery and flour confectionery products. Its location was opposed by local interests on the grounds of Government financing of a competitive and unwanted factory.

OBITER DICTA

● At a dinner party one should eat wisely but not too well—and talk well but not too wisely.—*Somerset Maugham.*

● "That," said the old lady on her first evening at the guest house, producing from the envelope a small square of browned bread and handing it to her hostess, "that is how I like my toast done."—*The Times.*

● The English, they are crazy. I offer them gazpacho—that is ice-cold Spanish soup with garlic—and they say "No, no." But if I ask them to taste "a typical Spanish soup" they say "Magnificent!"—*Spanish representative at the Food Fair.*

● As he drew up to the port side of the *Loch Fleet*, the *Odinn's* skipper soon gave up any idea of sending a boarding party. His vessel was subjected to a massive broadside of cod, plaice and haddock and any other riches of the deep coming to hand.—*Daily Telegraph.*

● "We pushed the gunboat off with broom handles," said the radio operator of the *Stella Canopus*. "The catering staff were rather well supplied with rather mouldy potatoes. The *Maria Julia* moved off. Later she returned but was met with another broadside."—*The Times.*

● The Hot Dog, first introduced in America in 1904, now boasts 75 varieties. Consumers' Union, a non-profit organisation, plans to ask Washington to impose grades for the hot dog since mothers so often choose them as a first food for children.—*Daily Express.*

● The regression coefficient of the logarithm of mean food expenditure per person on the logarithm of mean family income per head for a sample of households of given composition is an estimate of the income elasticity of total domestic food expenditure.—*7th Annual Report, National Food Survey Committee.*

● The workers must be more disciplined in their work and increase productivity—they must produce more and more goods with less and less effort. That was the way to raise the living standards of the Hungarian working class; but he did not wish to exaggerate his criticism, especially before lunch. Mr. Kruschev several times raised his fish to emphasise what he was saying.—*The Times.*

PEOPLE

Stanley Field

MR. W. H. BENNETT has retired as chairman and managing director and from the board of the Energen Foods Co. following on the acquisition of the company by Ranks, Ltd.

▪

MR. D. P. BELL has been appointed secretary of T. Wall and Sons (Meat Products), Ltd. His new appointment is additional to his existing responsibilities as the firm's accountant.

▪

MISS D. KNIGHT, B.A., F.L.A., DIP. LIB., has retired from her position as librarian of the National Institute for Research in Dairying, Shinfield, Reading and taken up an appointment as Information Officer and Librarian to Dr. J. G. Davis and Partners.

▪

MR. G. L. JACKSON has been appointed advertising manager of T. Wall and Sons (Ice Cream), Ltd., in succession to MR. F. C. L. JAMES, who has been appointed marketing information officer in the marketing division of Unilever, Ltd.

Mr. Jackson joined Wall's in 1950, and has served continuously in the advertising department.

Mr. James, who is now based at Unilever House, joined Wall's in 1948.

▪

MR. K. D. BENTON, A.R.I.C., has been appointed a member of the research staff of the British Baking Industries Research Association to fill the vacancy caused by the resignation of Mr. F. J. H. Ottaway who recently took up an appointment with the Bread Research Institute of Australia.

Mr. Benton, who is 27, obtained his National Diploma and Final City and Guilds (First-Class) in Breadmaking and Flour Confectionery at the Borough Polytechnic. Later he attended the Bradford Technical College where he obtained his Higher National Certificate and the A.R.I.C.

He joins the Association from the Nestle Co., Ltd., and has had previous experience with a firm of chemical manufacturers.

DR. J. D. ARMIT has been appointed a director of Triplex Holdings, Ltd., which controls the Triplex group of companies. For some years he has been a consultant chemist to the group. He was formerly a director of I.C.I. and wartime Director-General of Explosives at the Ministry of Supply.

▪

MR. ERIC L. E. HUMPHRISS, A.R.I.C., M.I.BIOL., has resigned his position as chief chemist and micro-biologist with S. Reece and Sons. He has set up as a consultant, analyst, bacteriologist, etc. His address is: 82, Linkstor Road, Woolton, Liverpool. Mr. Humphriss is a frequent contributor to FOOD MANUFACTURE.

▪

MR. F. M. FEATHERSTONE was recently appointed cheese factor by Wilts United Dairies, Ltd., Trowbridge. He has a long and wide practical experience in both the manufacture and marketing of English cheeses. He is the Cheddar member of the English Country Cheese Council, and frequently lectures on their behalf.

▪

MR. G. L. FORSTER has been appointed general production development manager of T. Wall and Sons (Ice Cream), Ltd.

Mr. Forster, formerly general works manager at the firm's London factory, will in his new post be responsible to the technical members of the board for plant and process development throughout the organisation.

▪

MR. STANLEY FIELD has been appointed chairman of Venesta, Ltd. He succeeds Mr. Henry Rutherford, who relinquished the chairmanship on medical advice and in recognition of fifty years distinguished service was created the company's first Honorary President.

From 1948 to 1953 Mr. Field was senior partner of W. N. Middleton and Co., at the same time acting as financial and general advisor to a number of industrial concerns. In 1953 he became managing director of the Prestige Group, Ltd., and shortly afterwards a director of the parent company, Ekco Products of Chicago. Two years later he became a director of Venesta and in February this year he relinquished his directorships of Prestige and Ekco Products to become deputy chairman of Venesta.

Obituary

MR. JOHN GILLISON DUNBAR, a director of the Edinburgh firm of James Dunbar, Ltd., mineral water manufacturers, died recently at the age of 85.

A 14-ton fully insulated vehicle the size of a double-decker bus is the latest addition to the Birds Eye fleet of delivery vehicles. The firm deliver to more than 40,000 quick-frozen food stockists in this country from more than 40 cold stores. The lorry has an insulated container which is permanently secured to the chassis and is capable of carrying 14 tons of quick-frozen foods. The container, using solid carbon dioxide as a refrigerant, holds the product temperature at 0° F. for a period of 24 hr. The Birds Eye transport fleet now comprises four types of vehicle, illustrated above.

Quick-frozen sea foods

St. Clair Fisheries of Thurso have now two more quick freezing plants in use at Boddam, in Aberdeenshire, and at Inverbervie, Kincardineshire, handling seafood packs. At Boddam crabs are the specialty; they are landed direct and processed immediately on landing. At Inverbervie crabs and lobsters brought from various Scottish ports are processed. St. Clair Fisheries have been particularly prominent in the development of natural Scottish resources and have been installed processing plant to make fish meal from the offal.

Creamery development

Aberdeen and District Milk Marketing Board has finished the first part of the new £500,000 creamery at Bucksburn, Aberdeen. The plant will be fully completed in 1959. Meantime the condensery has been completed and put into use; it is leased to General Milk Products, Ltd., and is capable of handling up to 12,000 gallons of milk daily. The product from this new condensery is then sent to Dumfries for further processing and canning. By this development the bulk transportation of liquid milk to the south has been cut drastically. Work is now progressing on the milk handling manufacturing departments, the administration block and a modern transport section.

Express Dairies' cheese factory

A cheese factory is in course of construction for the Express Dairy Co., Ltd., at Appleby. The factory, office block and other buildings will occupy an area of approximately 43,000 sq. ft.

The factory is a one storey building except at the cheese-making room where there is an upper floor. The building consists of various cold rooms, tank storage, cheese and butter making rooms, and dry storage. The reinforced concrete ground floor slab is divided into panels of approximately 1,000 sq. ft., and is further divided by ducts and falls. The walls and floors are tiled.

Danish bacon marking

The new marking on Danish bacon which enables the consumer to identify rashers as well as sides and cuts is the theme of the autumn advertising and television campaign for Danish bacon which started last month.

At the request of the retail trade A and B marking of sides was reintroduced last April for the first time since the war. This was additional to the word Danish and the Lurmark, part or all of which usually appeared on cuts, clearly showing the country of origin.

The repeated word Danish on the sides is now enclosed in a continuous strip by 2 lines 1¼ in. apart. The effect of this marking is that each rasher shows a little of the 2 lines on the rind. Part of one of the letters will often appear as well but it is the 2 marks 1¼ in. apart that identifies the rasher as Danish.

Dutch potato crisp firm

Smith's Potato Crisps (Overseas), Ltd., and N. V. Zuiderdel, a Dutch firm have jointly formed a company, Smith's Potato Crisps (Holland), Ltd., at Broek op Langendijk. The object of the firm, which has an authorised capital of £1·2 million, is to make potato products and other foodstuffs, particularly by the process used in the British company's factories.

Forthcoming Events

Society of Chemical Industry

Food Group

October 13-14. Symposium on Texture in Foods. Address Royal Society of Medicine, Wimpole Street, London, W.1.

Nutrition Panel

October 29. Nutritional Problems in the Polar Regions: Part 1, by Dr. J. P. Masterton and Major J. M. Adams. 6.15 p.m. Address: 14, Belgrave Square, London, S.W.1.

Nutrition Society

October 4. Symposium on Nutrition and Teeth. Address: London Hospital Medical College, Turner Street, London, E.1.

The Society for Analytical Chemistry

Midlands Section

October 14. The Identification of the new Permitted Food Colours. 7.00 p.m. Address: Gas Showrooms, Nottingham.

Imported boned chicken

S. Daniels and Co., Ltd., have been appointed as sole importers for *Ma Ling* boned chicken which is packed by the China National Foodstuffs Export Corporation of Shanghai.

Packed in 3 lb. round tins the chicken is stated to be suitable for use as an ingredient in making pies, canned meats, soups and other foodstuffs.

New research laboratory

Mr. T. M. Smith, managing director of Alfred Bird and Sons, Ltd., the Birmingham firm of food manufacturers, recently dug the first spadeful of soil on the site where a new £70,000 food research laboratory is to be built by the company. The laboratory will be located in Warwick Street, Birmingham, near the Deritend premises of the firm, and building work is to begin shortly. It is anticipated that the laboratory will be completed by September 1959 and that it will enable the firm to broaden its range of food products. A spokesman for the company, at the site inaugural ceremony, said that the management's intention was to develop at least two new products for the test market each year. "To do that we must be working on about 15 new products a year," he said, adding, "We estimate that for every 20 new products put on the market, only one succeeds."

British agents

Shaw Moisture Meters have been appointed as sole British agents for K. P. Mundinger, a German firm.

Aid to packaging

Fisher's Foils, Ltd., have installed at their works at Wembley a new sample room which reproduces in part the appearance of a self-service store. It is intended to show the impact that the manufacturer's package will have upon the public and enable the producer to see how his goods will look when they appear before the public.

Pre-packers complimented

Producers of pre-packed foods were complimented on their high standard of weighing and the accuracy of their instruments by Mr. L. A. Cave, Chief Inspector of Weights and Measures for Dudley, in his annual report issued recently

He says that the 99·8% weight accuracy in prepacked foodstuffs was highly satisfactory. During the year 12,920 articles of the foods were examined and only 23 were found to be deficient in weight.

Scottish representatives

J. and J. Neil (Temple), Ltd., Temple Park Iron Works, Glasgow, W.3, which have been acquired by James Hodgkinson (Salford), Ltd., have been appointed sole representatives in Scotland for Bennis Combustion, Ltd., Bennis Mechanisations, Ltd., and Saxon Engineering Co., Ltd. All are members of the Hodgkinson group of companies.

Mr. J. Douglas Cooper, chairman of J. and J. Neil (Temple), Ltd., will personally supervise this representation.

The London office of Bennis Combustion, Ltd., Bennis Mechanisations, Ltd., and Saxon Engineering Co., Ltd., has been moved to: Brettenham House, Lancaster Place, Strand, W.C.2. Telephone: Covent Garden 2188/9.

Company purchase

Aplin and Barrett, Ltd., have bought control of Plymouth wholesale provision merchants, Brown, Wills and Nicholson, Ltd., who manufacture and market food products under the name of Beechwood. Their products include sausages, pies, cooked meats, bacon, ham and pilchards.

The firm was founded in Plymouth in 1797 and the great-uncle of the present chairman, Mr. C. P. Brown, joined the company over a hundred years ago.

After the war, during which the company's premises were badly damaged in air raids, a wholesale grocery warehouse, offices and garages were built at Prince Rock, Plymouth, at a cost of £150,000.

The company's name will remain the same but there may be changes on the board of directors, from which the chairman and managing director, Mr. C. P. Brown, is retiring.

Technical Press Review

October

World Crops.—Mechanisation of Agriculture in India; Facts and Fallacies about Mechanisation in India; Tractor Populations and Agricultural Efficiency; Research at the National Institute of Agricultural Engineering; Fertilising Forest Trees.

Dairy Engineering.—Preview of the Dairy Show; Return of Skim Milk and Whey from the Creameries; Dairy Waste Disposal by Balanced Biochemical Bio-Oxidation—2; Transport of Milk by Road; Notes on Rinsing—2; Italy's Most Modern Dairy.

Manufacturing Chemist. — Air Conditioning in the Pharmaceutical Industry; Air Conditioning Plant for the Pharmaceutical Industry; Air Conditioning in Antibiotics Manufacture; Review of Air Conditioning Equipment; Recent Developments in Gas Chromatography —1; The Synthesis and Applications of Acyl Halides; Perfumes for Cosmetics—3; Progress Reports: Essential Oils and Perfumery; Pest Control Chemicals; Therapeutics.

Atomics. — Geneva Conference; Progress in Thermonuclear Fusion; The World's Progress in Fission Reactors; Industry's Powerful Tool—Isotopes; British Progress Cuts Heavy Water Costs; Britain Insures the World's Reactors; Atoms for Peace—Progress in Industry; Selecting the Reactor Coolant; Where Do We Stand in Regard to Radiation.

Automation Progress.—The Evolution of the Automatic Helmsman; Automatic Testing of Servo Mechanisms; Automatic Weighing; Magnetostriction Actuates Size Controlled Grinders; Digital Counting in Industry; Continuous Heat Treatment with Automatic Control —2.

Corrosion Technology.—Steels for the Petroleum Industry; Metal Spraying in Relation to the Corrosion Process; High Temperature H_2S Corrosion in Refinery Experience; The Preparation of Steel Surfaces for Repainting; New Developments in "In-Situ" Cleaning.

Chemical and Process Engineering.—Analogue Computers in Chemical Engineering Design Work; Lead as a Material of Construction for Chemical Plant; Fluid Handling; Oil Refinery/Power Station Water Treatment Plant; High Temperature Hot Water Heating for Chemical Processing; Review of Fuel Efficiency Exhibition.

Company Profits and Prospects

"600" group profits decline

The combined profits, before taxation, of the George Cohen 600 Group, Ltd., for the year ended March 31, 1958, amounted to £1,813,815. This compared with £2,336,628 in the previous year.

*

U.D. profits fall

The trading of the United Dairy group of companies fell during the year ended March 31, 1958 by £294,540 to £4,222,561. The dividend, 15% was repeated although it was on a larger capital.

Mr. L. Maggs, the chairman of the group, stated that the U.D. Engineering Co. had received a flow of orders during the past year for the bottling, mechanical handling and refrigerating equipment which the firm made.

*

Unilever increase profits

Unilever, Ltd., and Unilever, N.V., have published estimates of their turnover and profits during the first half of their financial year. Consolidated net profits amounted to £20·3 million for the first 6 months compared with £19·4 in the corresponding period of 1957. The turnover during the period was £860 million, £14 million down on the previous 6 months but £14 million up on that for the corresponding period of 1957.

*

Yeast sales hit

Reviewing the activities of some of the firms in the Distillers Co., Ltd., Sir Henry J. Ross, chairman, said that the lower consumption of bread in this country had been mainly responsible for the lower trend in the sales of yeast. He reported, however, that the export of dried yeast had proceeded satisfactorily during the year.

The severe competition provided by the importation of butter and lard at cut prices had reduced the profit-margin of the Peerless Refining Co. (Liverpool), Ltd., Sir Henry also reported.

The group trading profit, after depreciation, amounted to £22,681,751 compared with £21,432,602.

A London office

London office facilities are part of the services offered to industry by a new company, Industrial Associates, Ltd., 64-66, Oxford Street, W.1. The firm offer inter alia, the use of their address and telephone number, office accommodation including secretarial staff, and representation in the South of England. Fees are scaled to the facilities required.

Food News Overseas

Sugar refinery modernisation

The large Mexican sugar refinery of "El Potrero" has just been granted a U.S. $3 million loan for repayment over 10 years to enable it to modernise and expand its equipment.

Soluble coffee plant

The Compania Nacional de Chocolates, a Colombian firm, is to construct a plant in Medellin for the production of soluble coffee. Import licences for machinery to the value of U.S. $175,000 have already been authorised.

Norwegian fish canning slump

Poor fishing and a consequent lack of raw materials are reported to be causing concern to the Norwegian fish canning industry. Up to July 19 of this year only 186,000 cases of fish products had been canned compared with 419,000 cases at the same time last year.

Nyasaland tea exports drop

Nyasaland's exports of tea during the first 5 months of the year dropped by more than 2 million lb., says Barclays Bank D.C.O.

A new tea estate is being pioneered near Nkata Bay, where it is hoped that planting will begin at the end of the year, and some leaf will be available by 1960.

A second tea factory has been built on the 1,250 acre Lujeri Tea Estate.

Canadian Food Technology Conference

The first Annual Conference of the Canadian Institute of Food Technology was held recently. Mr. J. H. Tulse, head of food research for the Defence Research Board of Canada and formerly senior liaison officer with the British Baking Industries Research Association, was elected president. The Federal Minister of Fisheries, the Honourable J. Angus MacLean was guest of honour at the conference.

Dehydration plant

A new £30,000 factory has been completed at Port Shepstone on the Natal South Coast which will enable pineapple growers to process surplus fruit for out of season sales. The plant includes modern dehydration equipment and is designed to handle various exotic fruits which are often available at present for short periods only each year. These fruits include lychees and bananas as well as pineapples. It is also planned to manufacture special lines such as chocolate-coated fruits for the Union market.

Canned whale meat

South Africa's first attempt to can whale meat commercially in bulk for human consumption is in full swing at a St. Helena canning factory. This canned whale meat is in the form of a pre-cooked stew, rich in protein. It will sell to the consumer for about 1s. per lb.

A spokesman of the company stated that the first canned whale meat had already been delivered from the factory and the result has been satisfactory. Apart from supplying the big employers of African labour in the Union, export as far as the Belgian Congo is also being planned.

South Australian winery extensions

The Berri Co-operative Winery and Distillery, Ltd., South Australia, has announced that the processing facilities of the company will be extended by the construction of an additional fermenting winery and the installation of further distillation wine storage tanks.

The new fermentary is planned to handle the company's dry table wine production which has considerably increased during the last 5 to 6 years, in both dry white and dry red. It will be located near the refrigeration room to facilitate processing.

The company is the largest single wine and brandy producing unit in Australia.

Pineapple products research

The Pineapple Research Station at Collondale, near East London, has an extensive research programme on hand, designed not only to improve the quality and yield of the crop but also to utilise more fully the various parts of the plant which are at present wasted in South Africa. The officer in charge of the station recently returned from a survey of overseas developments in pineapple research including the progress made in Hawaii in obtaining chemicals from the leaves and waste pulp at the canning factories. One Hawaian firm has already recovered 80,000 tons of sugar from waste juice and products such as citric acid, alcohol and the enzyme bromelain have also been successfully extracted from wastes.

The Collondale Station now has more than 200,000 pines available for study and large scale experiments in achieving the Australian yield of 29 tons of fruit per acre excluding tops are being carried out.

Sugar handling in B. Guiana

A new $1 million company, Demerara Sugar Terminals, Ltd., has recently been registered in British Guiana. Formed to handle the bulk loading of sugar, the company aims to modernise the shipping methods of the industry, bringing these in line with those of competitors in the world's sugar markets.

Land has been purchased at Ruimveldt, East Bank, Demerara, where soil tests are being carried out preparatory to laying the foundations for the stores. On account of soft riverain soil, it is proposed that the sugar should be stored horizontally in two stores of 20,000 tons capacity each rather than vertically in silos. Construction is scheduled to start shortly and it is anticipated that the project will be completed in 2 years.

Booker Sugar Estates, Ltd., and Sandbach Parker and Co., Ltd., are associated in the formation of this company. The whole project involves expenditure of some $6 million not including the cost of re-modelling coastal ships nor the extensive alterations which will now be needed on sugar estates in order to meet the new storage requirements.

News for Importers

Import duties exemptions.—The Treasury have made the Import Duties (Exemptions) (No. 13) Order, 1958, which withdraws the exemption hitherto applicable and imposes Customs duty at 10% *ad valorem* on salted or pickled pork.

The Order has been published as Statutory Instruments 1958, No. 1085.

Preservatives in food.—The Minister of Agriculture, Fisheries and Food and the Minister of Health, acting jointly, have made the Public Health (Preservatives etc. in Food) (Amendment) Regulations 1958. The regulations permit the importation and sale of citrus fruit which contain diphenyl or ortho-phenylphenol or admixtures of the two substances within prescribed limits.

New Companies

Abbey Produce, Ltd. (603320.) Defford Road, Pershore, Worcs. Mnfrs. of and dealers in foods, etc. £10,000. Dirs.: Leonard Coates, Sidney R. Mence, Robert C. Lees, Peter Hutchinson and James R. Macdonald.

B. and M. (Frozen Foods), Ltd. (608144.) 4, North Terrace, Wisbech, Cambs. £10,000. Dirs.: Sydney Berridge and E. B. H. J. Mason.

Benn-Ivor, Ltd. (609337.) 16, Dalton Street, Manchester, 2. Producers, mnfrs. and importers of and dealers in corn, flour, fruit, vegetables, pickles, spices, etc. £100. Dirs.: Leah Giersh and Mrs. B. Levin.

Coastal Creameries, Ltd. (609436.) "The Moorings," Runswick Bay, nr. Saltburn, Yorks. £100. Dirs.: J. F. and Mrs. Mary Taylor.

Victor F. Harper and Co., Ltd. (608208.) 109, Colmore Road, Birmingham, 3. To carry on the business of confectionery and ice cream mnfrs., etc. £100. Dirs.: Victor F., Mrs. Rosemary M. E., and Victor C. Harper.

Herb-Royal, Ltd. (607782.) To carry on the business of mnfrs. and dealers in animal feedingstuffs, etc. £1,000. Dirs.: F. N. Turner, Ferne Farm, Shaftesbury, H. J. Lederman, M. K. Clark and Lorna M. Turner.

Lostock Hall Egg Packers, Ltd. (609804.) 50, Todd Lane, Lostock Hall, nr. Preston, Lancs. £200. Dirs.: Eric R. Garlic and Gilbert Rennicker.

C. B. Lowe (Ashby), Ltd. (599306.) 52, Market Street, Ashby-de-la-Zouch. Millers, flour and offal dealers, etc. £1,000. Dirs.: A. E. Fidler and J. F. Vere.

Lusty's Natural Products Co., Ltd. (598793.) 278/80, London Road, Westcliff-on-Sea. To take over the business of herbalist and health food specialist. £7,500. Dirs.: W. E. and Mrs. May E. Lusty.

Mayfair Bakery, Ltd. (600840.) 8, Widmore Road, Bromley, Kent. £4,000. Subs.: J. J. Moreton and Anthony H. Isaacs.

B. Middleton, Ltd. (599546.) 55, Commercial Street, Morley, nr. Leeds. Mnfrs. of and dealers in cooked and prepared meats, etc. £2,000. Dirs.: Benjamin and Mrs. Hilda Middleton.

Milton Webber, Ltd. (599570.) 94, Boundary, Pontypridd, Glam. Mnfrs. and dealers in confectionery, etc. £2,000. Permt. Dirs.: C. B. M. and Miss Myra J. Webster.

North-East Direct Supply, Ltd. (600794.) 2, Manor Row, Bradford, 1. Mnfrs. of and bottlers of and dlrs. in mineral waters, etc. £5,000. Dirs.: Herbert and Lilian M. Sutcliffe.

Shaktro, Ltd. (602502.) Mnfrs. of and dealers in foods, drinks, sweets, etc. £100. Subs.: J. and T. A. Herbert, 156, Strand, London, W.C.2.

Walter E. Tart and Son, Ltd. (603034.) 267, Two Mile Hill, Kingswood, Bristol. Bakers, bread and biscuit mnfrs., etc. £2,000. Dirs.: Walter E. F., John W. and Mrs. Lydia Tart.

Trebor (Exports), Ltd. (602852.) Trebor House, Woodford Avenue, Ilford, Essex. Mnfrs. of and dealers in sweets, chocolate, confectionery, toffee, etc. £100. Dirs.: S. J. Marks and C. J. Robertson.

Trebor (U.K.), Ltd. (602853.) Details similar to Trebor (Exports), Ltd., above.

Wigley's (Bakers), Ltd. (603222.) Main Street, Middleton, Derby. £2,000. Dirs.: F. J. and Mrs. S. F. Wigley.

Williams Pure Ices, Ltd. (602678.) 58, Gifford Terrace, Mutley, Plymouth. £1,000. Dirs.: B. I. and H. Williams.

A. J. Wintle and Sons, Ltd. (603111.) Bill Mills, Weston-under-Penyard, nr. Ross-on-Wye. Mnfrs., bottlers and dealers in mineral and aerated waters, etc. £6,000. Dirs.: Wm. N. Wintle and Brian C. Jenkins.

Woodcliffe Bakery, Ltd. (609387.) Thomas Foster and Co., 26, Corporation Street, Manchester, 8. £500. Dirs.: Aubyn F. Taylor and Lewis Faulkner.

These particulars of new companies recently registered have been extracted from the daily register of Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

New Scottish Companies

Barrhead Bonding Co., Ltd. (33010.) 3, Robertson Street, Barrhead. Brewers, tillers, etc. £100. Dirs.: E. N. M. Gardiner and Mrs. S. F. Gardiner.

Irving F. Garrett, Ltd. (33008.) 93, Hope Street, Glasgow. Brewers, distillers, etc. £100. Dirs.: Irving F. Garrett and Elizabeth B. T. Garrett.

James P. Loudon, Ltd. (32619.) 34, Spoutmouth, Glasgow. Mnfrs., curers and smokers of bacon and ham and all kinds of cooked, cured and preserved meat, fish, poultry, etc. (£20,000. Dirs.: James P. Loudon and Sarah B. Loudon.

Macquer and Co., Ltd. (32773.) Mnfrs. of and dealers in aerated and mineral waters, and blenders, bottlers and refiners of wines, spirits, etc. £1,250. Dirs.: Achille Leone Foa and John Ludovic Gardner.

W. D. McKenzie and Co. (Glasgow), Ltd. (32812.) 11, Bothwell Street, Glasgow. Brewers, etc. £5,000. Dirs.: Wm. Dawson McKenzie and Chas. W. S. Steel.

Melo Confectionery (Manufacturing), Co., Ltd. (32612.) Makers of and dealers in chocolate, cocoa, confectionery, biscuits, etc. £1,000. Dirs.: to be appointed. Subs.: John Don Francesco, 45a, Dalrymple Loan, Musselburgh, and Lawrence Ambrosa.

Midcalder Bakery, Ltd. (32754.) 14, Cameron Park, Edinburgh. Bakers. £2,000. Dirs.: R. T. C. Mutch, D. W. Girvan and Peter McDonald.

Old Consort Co., Ltd. (33009.) 3, Robertson Street, Barrhead. Brewers, disaillers, etc. £100. Dirs.: E. N. M. Gardiner and Mrs. S. F. Gardiner.

John Poynter, Son and Macdonalds, Ltd. (32621.) 51, Biggar Street, Glasgow. Mnfrs. of and dealers in bakery powder, etc. £100. Dirs.: R. J. G. Macdonald, Allan V. Macdonald and A. W. Macdonald.

Howard Robison (Oban), Ltd. (32891.) Commercial Bank Buildings, Oban. Fish curers and mchts. £10,000. Dirs.: Wm. Howard Robison, Mrs. Isobel Tait Robison and Miss Mary Margaret McIver.

C. Smith and Sons (Pork Butchers), Ltd. (32888.) Dunfermline. Cooked meat and sausage mnfrs. £5,000. Dirs.: to be appointed.

Strathdearn Scottish Distillers, Ltd. (32865.) 51, Queen Street, Edinburgh. Whisky blenders, etc. £100. Dirs.: Alastair Grant Saunders and Leo Stanton Wright.

Trade Marks

BOSCO.—B765,044. Non-alcoholic milk beverages. **Corn Products Refining Co.**, 17, Battery Place, New York, New York State, U.S.A.

KINGCUP.—765,312. Edible oils and edible fats, all for sale in Aden, Bahrain, British Honduras and Mauritius. **Unilever Export, N.V.**, Museumpark 1, Rotterdam, Holland.

CHATEAU.—767,570. Cheese. **J. Bibby and Sons, Ltd.**, 21, King Edward Street, Liverpool, 3; and **Fromagerie Bouchu**, 34, 37, Rue Henri-Baigue, Besancon, Doubs, France.

AGROVITE.—765,041. Animal feedingstuffs containing vitamins. **The Crookes Laboratories, Ltd.**, Gorst Road, London, N.W.10.

SUNFIELD.—765,294. Fruit juices; and non-alcoholic fruit extracts (not being essential oils) for use in making beverages. **C. W. Field, Ltd.**, Edwards Lane, Speke, Liverpool, 19.

VAN CAMP'S.—B773,810. Fresh fish (other than live) and canned, smoked, salted and frozen fish. **Van Camp Sea Food Co., Inc.**, 772, Tuna Street, Terminal Island, California, U.S.A.

GAIETY.—776,126. All goods included in Class 29. **A. J. Mills and Co., Ltd.**, Colonial House, Tooley Street, London, S.E.1.

LICO-MINTS.—774,987. Non-medicated confectionery flavoured with mint. **Geo. Bassett and Co., Ltd.**, Beulah Road, Owlerton, Sheffield, 6.

MERVETTE.—775,782. Non-medicated confectionery. **Helco (England), Ltd.**, Barn House, Cherry Garden Lane, Maidenhead.

CLOVERDALE. — B772,892. Canned meats. **Country-Fare Meat Products Proprietory, Ltd.**, Alfred Road, Moorebank, New South Wales, Australia.

LA CUCURACHA.—773,022. Meat; fish, poultry and game, none being live; meat extracts, preserved, dried and cooked fruits and vegetables; jellies (for food), jams, dairy products (for food), edible oils, edible fats, pickles; and fruit preserves and vegetable preserves. **S. Daniels and Co., Ltd.**, Oxford House, 15, Crosswall, London, E.C.3.

PROT-O-FATS.—B774,514. Edible fats containing anti-oxidants, for addition to animal feedingstuffs. **Agricultural Supplies (Ulster), Ltd.**, 64-70, Great Georges Street, Belfast, Northern Ireland.

SEGA.—B774,798. Caviar. **W. G. White, Ltd.**, 17, Orange Street, Leicester Square, London, W.C.2.

UNILAIT.—775,882. Butter. **French Dairy Farmers, Ltd.**, 15, Hanover Square, London, S.W.1.

HENTEX.—776,186. Powdered hens' eggs. **Henningsen, Inc.**, 347, Madison Avenue, New York, 17, U.S.A.

ALTURAS PALENQUE. — B772,559. Coffee. **J. Coler and Cia., S.A.**, Guantanamo, Province of Oriente, Cuba.

SUMMER DAY.—774,016. Rice, tapioca, sago, dried semolina, pearl barley; and preparations made from cereals for food for human consumption. **Fine Fare, Ltd.**, Wigmores North, Welwyn Garden City, Herts.

CULROSE.—776,112. All goods included in Class 30. **Culrose Foods, Ltd.**, Culrose House, 100, Tooley Street, London, S.E.1.

VITASEED.—770,436. Food, containing seeds and vitamins, for birds. **F. M. Langford, Ltd.**, 40, Wellclose Square, London, E.1.

Packaging

Matinee creams

Meredith and Drew have recently introduced a new packet of semi-sweet sandwich biscuits under the name of *Matinee Creams*.

The design incorporates a family resemblance common to the other packets in their range, and is printed on *Diolam* which provides excellent protection to the contents.

Transparent double-sided tape

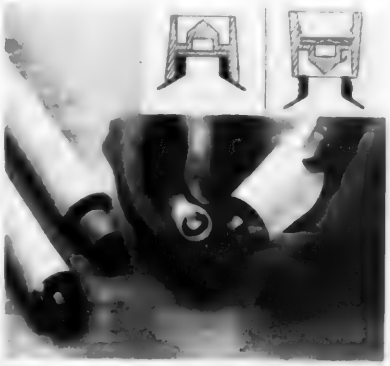
John Gosheron and Co., Ltd., have added to their range of double-sided self-adhesive tapes a transparent cellulose tape which has a highly tenacious adhesive mass both sides of the base material.

Double-sided cellulose tape has been developed to give an extremely thin, yet strong, mounting medium where surfaces have to be joined as closely as possible. Three base materials are now available—paper and cloth (in 50 yd. lengths) and cellulose (in 36 yd. lengths).

Spiked piercing cap

A spiked piercing cap for collapsible tubes is being offered by John Dale, Ltd., who say that it satisfies the modern trend for streamlined packaging.

For many years the firm have been supplying collapsible tubes with a pierceable membrane seal over the nozzle, together with a conventional mushroom shaped cap with a spike on the top for piercing the membrane. Originally these were only supplied in pure tin, but for the last 18 months or so such tubes have been available in aluminium as well as the soft metal, thus satisfying the demand for the cheaper tube.



The new spiked piercing cap for foil tubes, marketed by John Dale, Ltd.

Aluminium foil wrap

A newly designed aluminium foil wrap has been adopted for their *Samoa* chocolate biscuits by Macfarlane Lang. The wrap chosen is comprised of ·009/·01 mm. unembossed foil wax backed to 13½ lb. D/C tissue. Made by Venesta, Ltd., the foil is printed in 4 colours.

The makers say that the foil not only excludes moisture but it prevents the chocolate from being tainted by other goods. The low conductivity of the foil also helps to maintain the chocolate at a relatively even temperature. Allied to the protective qualities of the foil the makers say that the printing and finish of the foil impart a high degree of sales appeal.

Samoa biscuits, now packed in a newly designed foil wrap supplied by Venesta.

Reflective sheeting

A product designed to improve safety and cut down accidents in industry has recently been displayed by the Minnesota Mining and Manufacturing Co., Ltd.

It is known as *Scotchlite Reflective Sheeting* and is used for pinpointing signs at night. It consists of millions of microscopic glass spheres which reflect light back to its source with great brilliance and is said to have a reflective power of up to 175 times that of white paint. These spheres, acting as retro-reflective lenses, are bonded to a durable film coated on the reverse side with a pressure-sensitive adhesive which sticks to almost any non-porous surface. It is claimed that the appliance has a reflective arc of 150°.

The material is available in all the colours in accordance with the British Standard for industrial signs.

Cellophane film is used to overwrap Lowe's new 4-bar dog food.

Pet food presentation

A dog's meat course, made from dried concentrated butcher's meat, liver and yeast, and pressed into a 4 segmented bar, is now being wrapped in *Cellophane* cellulose film. The meat product, *Allmeat Bar*, is made by F. C. Lowe and Son, Ltd., who say that the food is equivalent to 2½ times its own weight in fresh meat.

An odour-proof, air-proof and moisture-proof film was chosen, it is stated, so that the pack could be stacked and safely displayed near other food products. The bar is placed on a card base, on the underside of which is a label giving the manufacturer's name and instructions for use, and the bar is then overwrapped and heat-sealed on the back.

Super-thin polythene film

The Metal Box Co., Ltd., has introduced a new 75 gauge (·00075) *Diothene* polythene film. The new gauge is said to be exceptionally clear, and can be multicolour printed on layflat tubing or supplied in printed *Perforoll* bag form.

A big demand is expected for the new gauge film, especially for the packaging of textiles and foods. With a nominal covering area of 40,000 sq. in. per lb., this film is claimed to be far cheaper than any grade of cellulose film.

The Metal Box Co. is also producing a new range of Diothene sideweld bags. These bags have fine bead sideseams with no bottom bar seal and skirt, which gives a neater appearance. Lips in several forms can be incorporated for ease of filling or reclosure. A wide range of sizes and shapes is available. The new side seam bags can be printed both back and front in up to four colours.

New Christmas packs for biscuits. On the left, three tins and one pack designed for Meredith and Drew. On the right, five tins designed for Frears, Ltd.

Canned sausage casing

The potential business in canned sausages which became apparent after the war called for a special type of casing—one which would be edible and bear a close resemblance to the natural article and which was, in itself, sterile.

The Oppenheimer Casing Co. (U.K.), Ltd., have announced that as a result of their work they have developed a new casing made from alginate which they describe as closely resembling the natural product but without its drawbacks. Their new casings, *Hypak S*, is supplied already spooled on a plastic tube and enclosed within a waterproof bag, each bag containing 100 yd. of casing.

Production with the casing is stated to be simple. All that the operator has to do is to place the tube of casing, which is stated to be free from bacteria, directly on to the filler nozzle and fill in the normal manner.

Polythene packaging display

Numerous examples of modern polythene packs were displayed recently at an "open day" held by Spesco Developments, Ltd., at their factory in Hanworth Lane, Chertsey, Surrey.

Specialists in the production and printing of all types of polythene packs, Spesco showed a wide variety of commodities including vegetables and frozen foods, packed in *Spescopaks*.

The various stages of production were described and a demonstration given of the aniline dye process employed in printing. A new printing and conversion unit has recently been installed which will print up to four colours with, it is believed, far greater accuracy than most machines used in the United Kingdom today.

The firm stated that further development is continuing and experiments in the conversion and printing of other materials is progressing favourably.

New packs for meat products

C. and T. Harris (Calne), Ltd., have introduced new packages of skinless sausages — *Chipolata Eighteens* and *Chipolata Twentyfours*—the figure indicating the number of sausages to the pound. They are packed in printed *QSAT* transparent film supplied and printed by British Sidac, Ltd. The wrappers, which were designed by M. Goaman, M.S.I.A., have a white band overprinted with blue for pork and red for beef, following the style introduced a short time ago for the sixes and eights.

The wrapping of *Harris* pies has been introduced in two stages: plain transparent film and a printed label were used in the first stage which has now been replaced by a printed wrapper of *Diophane PT300*, supplied and printed by Clearpack, Ltd. This also was designed by M. Goaman, using blue and white for pork pies and red and white for veal, ham and egg pies.

The recently introduced *Harris Chopped Cured Pork* is packed in a 7 oz. key-opening rectangular can produced by the Metal Box Co., Ltd., and designed by W. S. Crawford, Ltd. It is a lithographed can with a Stratford red background overprinted in black and white.

Protecting hygroscopic powders

A problem which has faced those making hygroscopic products is providing a satisfactory pack at an economical price. The development of a heat-seal coated aluminium foil wallet by Foster Clark, Ltd., in conjunction with the Venesta Foil Division, is claimed to be an effective answer.

The products in question were the *Eiffel Tower* range of fruit-flavoured drink powders made by Foster Clark, Ltd., and the material adopted for the powders was .009/.01 mm. *Venesta* foil laminated to 50 g. heat-seal coated G.I.P. paper, supplied in reels to form wallets 3¼ in. × 2¾ in. The foil is 2 colour printed on the uncoated side.

A Swedish *Kisab* machine with a

"New Look" Harris products. Sausages are wrapped in transparent film, printed red for beef and blue for pork. Pies are wrapped in Diophane, and chopped cured pork comes in a new lithographed can.

Plastic lids for cream cartons, a new idea by Mono Containers, Ltd.

volumetric filler, producing filled wallets at a rate of 170 per min., was adopted for the filling operation. Here the product is gravity fed from a hopper, the foil being drawn from a reel. The exact quantity of powder is measured into a revolving drum which deposits it in the centre of the foil, which then passes on for sealing and trimming in a continuous process.

Plastic lid cream carton

Cream cartons fitted with replaceable plastic lids are now being marketed by Mono Containers, Ltd., who believe that theirs is the first such carton offered to food manufacturers.

The plastic lid, the cost of which is fractionally higher than that of normal lids, not only protects the cream from dust and dirt but can be used a number of times.

The firm are now making four different lids for cream cartons: disc lids, metal foil lids, plastic lids, and screw caps.

Lithoprinting on foil

The introduction of new printing techniques which enable foil to be effectively lithoprinted has been announced by E. S. and A. Robinson, Ltd. Robinsons' say that the printing of foil by the litho off-set process means that cartons and displays produced from foil-laminated board can now be supplied with the superior colour reproduction and definition of lithoprinting for what is understood to be the first time in this country.

Apart from the higher quality of lithoprinting, it is claimed that alterations to designs printed on foil can now be carried out comparatively simply, and foil cartons, displays and labels can be printed economically in short runs. Previously, foil-laminated board had to be printed by the letterpress or gravure processes. The use of letterpress imposed certain limitations on both the type of design and quality of reproduction. With the gravure process, the expense of the original cylinders meant that this type of printing could only be reasonably justified where long runs were concerned.

An order has been completed by Robinsons' for a 6 colour lithoprinted foil carton for *Valiant* macaroon cake filling.

Flavour protection

Strip-packaging, hitherto used almost exclusively by the pharmaceutical industry, has now been adopted by Standard Brands, Ltd., who are protecting the flavouring ingredients contained in their cartons of *Royal* lemon and orange pie-fillings by strip-packaging them.

The flavouring ingredients are citric acid tablets and capsules of either lemon or orange oil. One tablet and one capsule go into each carton. For the lemon pie they are sealed between two plies of moistureproof *Cellophane* cellulose film, and for the orange between a web of *Cellophane* film and a web of golden foil. The foil is lacquered so that it can be heat-sealed to the film.

The strip is attached to the packet of filling powder—the other ingredient in each carton—with transparent adhesive tape.

The strip-packaging is carried out on fully-automatic machinery by the Ivers-Lee unit-packaging service.

Christmas chocolate boxes

Several new chocolate boxes have been designed for C. Kunzle, Ltd., for their Christmas lines.

The first two of these have been supplied by members of the Bowater Eburite Group. The first is known as the Winchester box and it is a multi-coloured floral box top affixed to a flanged and padded lift off lid box. The flange on the base of this box is blue to match the predominating colour of the background of the lid. The chocolates inside are foiled to match

Strip packaging is now used to protect flavouring ingredients in Royal desserts.

the predominating colour scheme. The box is made by Hunt Partners.

The second box is a 5 lb. casket with extended ends. The colour scheme of the box is a maroon base with a light blue lid. A diagonal ribbon is in maroon and blue. In this case the box is made by Andrew Ritchie.

The two other boxes are made by H. Tramer, Ltd. The first is made from blue and silver metallic paper and the diagonal ribbon is a royal blue matching the deeper blue of the foiled lid. The second of the boxes is a red and white check circular box with a lift-off lid. A rosette forms the adornment on the lid.

Horseradish sauce tube

Universal Metal Products, Ltd., are making an aluminium tube for Noel and Sons, Ltd., for the packaging of their horseradish sauce.

The tube is printed in black and red on buff enamel, and is fitted with a cap in white plastic material incorporating the original U.M.P. patented valve-type wadless closure.

The tube is also supplied with the *Weltex* base seal, developed by U.M.P., which is said to ensure that no seepage takes place at the base.

More new Christmas packs, this time for Kunzle's chocolates.

Recent Patents

799,676. MARGARINBLAGET AKTIEBOLAGET: Improving taste of margarine.
800,030. DISTILLERS CO., LTD.: Production of bakers' yeast.
800,422. BAKER PERKINS, LTD.: Panning of dough pieces.
800,476. RUHRCHEMIE A-G.: Sterilisable packaging of foods, etc.
800,530. GENOTASAN, LTD.: Food products.
800,533. SUDAN GEZIRA BOARD: Food products derived from cotton seed.

ABSTRACTS OF BRITISH PATENTS

Treatment of milk

Milk, including concentrated milk, frozen in small containers, shows, on thawing, separation of fat, which cannot readily be re-dispersed, and which gives the product an unsatisfactory appearance. To eliminate this effect, it is proposed to subject the milk to be frozen to ultrasonic vibration of frequency 0·75-2·0 megacycles per second. Freezing is carried out within an hour of this treatment.

Preliminary pasteurisation is recommended to increase storage life, as the ultrasonic vibratory treatment is not a satisfactory method of sterilisation.—798,863. *National Research Development Corporation.*

Preserving dressed poultry

The short shelf-life of dressed poultry has previously been extended by dipping freshly killed chickens in water containing 3-30 p.p.m. of chlortetracycline and subsequently storing at 40°F. The disadvantage of this procedure has been that formation of scum or precipitate occurs when a tetracycline antibiotic or its metallic or acid salts are present in water at 1,000-10,000 p.p.m. concentration unless the water is deionised. Loss of available antibiotic results, which the present invention claims to avoid.

The aqueous antibiotic solution contains also one or more solid, non-toxic, water-soluble acids such as citric, gluconic, tartaric, malic, ascorbic, and itaconic acids, in the proportion of 1-3 parts acid to 1 part antibiotic. Other substances also present consist of wetting agent such as a fatty acid ester of a polyoxyalkylene glycol or polyoxyethylene sorbitan mono-oleate, and a diluent which may be any inert, non-toxic, water-soluble substance, preferably sodium chloride.

To prepare the dipping solution, the solid ingredients are dissolved in water to make a stock solution containing about 1,000 p.p.m. of the antibiotic. This solution is diluted before use to prepare the actual dipping solution, so that the latter contains, preferably, 10 p.p.m. of antibiotic, usually chlortetracycline, about 10 p.p.m. of citric acid, about 1 p.p.m. of the wetting agent and about 79 p.p.m. of the inert diluent. The cleaned poultry is immersed in the above solution in an iced water bath for at least half an hour, removed, and, without washing, packaged and distributed. — 799,240. *American Cyanamid Company.*

Improved mincing machine

To speed mincing, especially of meat already minced and to be passed through the mincer a second time, a new mincer barrel has been designed. Its principal feature is a spiral flute which is an integral part of the inner surface of the barrel. This flute has a pitch which decreases for a distance from the feed of the barrel but remains constant for the rest of the length right up to the outlet. The machine is shown in a sheet of three drawings.—799,254. *Toledo Scale Company, U.S.A.*

Sausage casings

Proteinaceous films, tubes, and the like, made by extrusion of a solution into an aqueous coagulating bath and hardened by formaldehyde, for example, are rendered transparent, even after contact with moisture, without loss of strength and elasticity.

The extruded material is first hardened in a suitable solution, that preferred containing 3% formaldehyde and 22% sodium sulphate, the latter being present to prevent disintegration. The time is 4 min. and the temperature 80°C.

After washing, the material is heat-treated in an organic liquid, immiscible with water, such as groundnut oil, mineral oils, hydrogenated vegetable fats, or the like, or an organic solvent such as xylene. The immersion temperature is usually at least 115°C., at atmospheric pressure. If it is between 115° and 120°C., the immersion time is not critical. After the heat treatment, immersion of the material in water or in an aqueous electrolyte solution is recommended to restore the moisture equilibrium.—799,353. *Unilever, Ltd.*

Sugar refining

The invention relates to the pre-separation method of refining crude sugar juice, in which about 0·2-0·3% of calcium oxide is added to give a *p*H of about 10·8-11·0. In the older procedure, more lime was added and the solution saturated with carbon dioxide. It is now proposed to use a particularly reactive magnesium hydroxide, claimed to have a loose structure and a large surface area of particles. It is prepared by two consecutive reactions, both carried out *in situ*, the first of which is that between carbon dioxide and magnesium oxide, or sources thereof, such as half-burnt dolomite. The magnesium carbonate produced is then converted to magnesium hydroxide by the action of lime.

In the first of nine examples, raw beet juice of 14° Brix is pre-separated in 25 min. by the gradual addition of 0·34% calcium oxide in the form of milk of lime of 23° Beaumé, at 45-50°C. The *p*H is then 10·8. The juice is then slowly heated to 80°C., and mixed with 79 c.c. per l. of a 10% suspension of activated dolomite milk prepared by treating an aqueous suspension of half-burnt dolomite of 25% magnesium oxide content at 50°C. or lower with 165 l. of an air and carbon dioxide mixture containing about 12% of carbon dioxide. The half-burnt dolomite suspension contains about 100 g. per l. The *p*H falls to 9·6, and the filtration speed is 32% higher than in conventional separation.

After filtration, further purification may be effected by saturation of the juice with carbon dioxide to a *p*H of 8·8, and an additional filtration.—798,881. *Magnetit A-G, Switzerland.*

Bakery ovens

Ovens, in which articles being baked are carried through on an endless steel band or similar conveyor, are liable to overheating of the unsupported edges or marginal portions, causing the difficulty called "edging." This may vary according to the type of article baked.

The invention, illustrated by a sheet of seven drawings, provides adjustable screening to reduce or eliminate "edging." The screening means, made in independent contiguous section lengths, straight or curved, can be so oriented or positioned as to vary the shielding of the band margins. They may be placed above or below the conveyor band, or both.—799,086. *Baker Perkins, Ltd.*

Coloured food product

This invention relates to the colouring of food products sold as a dry powder that is mixed with water during the preparation of the foods. The object of the invention is to provide a composition in which the caramel or food dye does not float out or diffuse unevenly or otherwise give rise to faulty mixing.

The patent provides for the use of a water-soluble cellulose ether such as sodium carboxymethyl cellulose to effect this evenness of colour distribution. This is used at levels of from 0·25 to 1·1%, along with the basic ingredients, flavouring and colouring matter.

Advantages claimed for this compound are that it is less readily attacked by bacteria than starch or casein, and is unaffected by extremes of heat and cold. It is also tasteless. The invention is said to be particularly adapted to the production of dehydrated foods in powdered form, as the colour and cellulose ether may be added either before or after dehydration.

Colour stability on exposure of the product, as well as evenness of colour distribution, is said to be favourably affected. Examples quoted include mixtures for coloured icing, ice cream, orange sherbert, gelatine dessert powders, and chocolate-flavoured products such as fudge, pudding and cake.—797,256. *Union Starch and Refining Co., Inc.*

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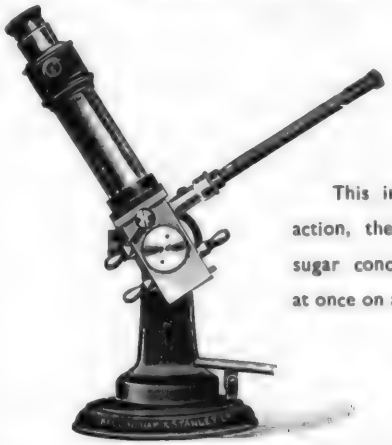

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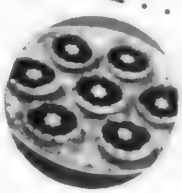

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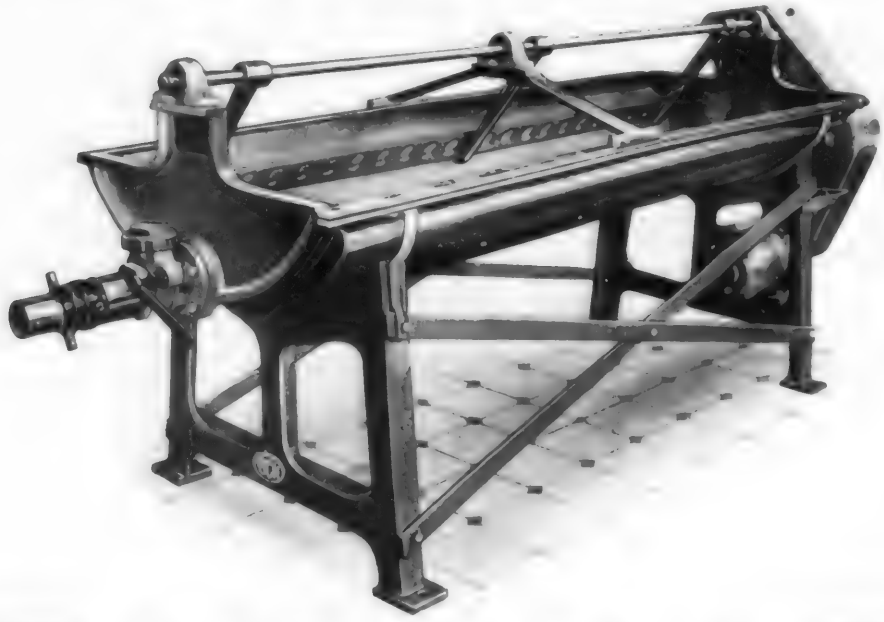

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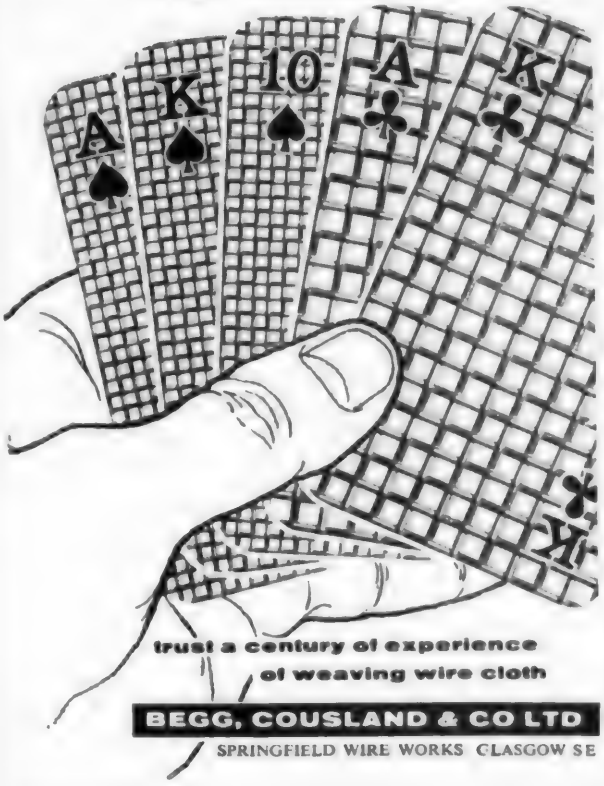

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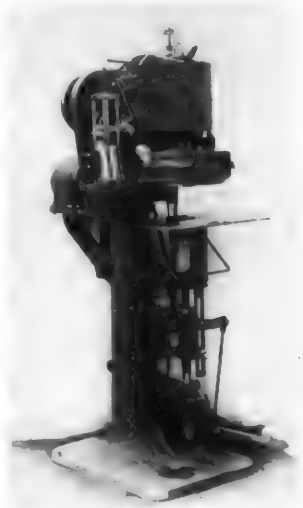

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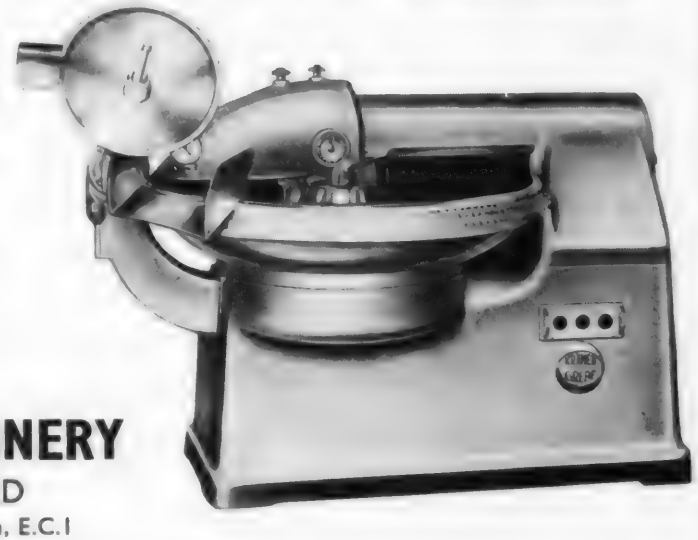

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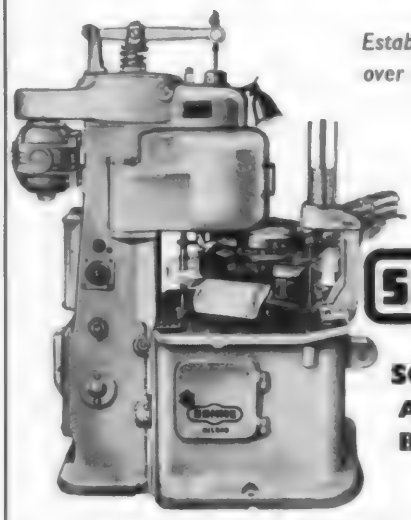

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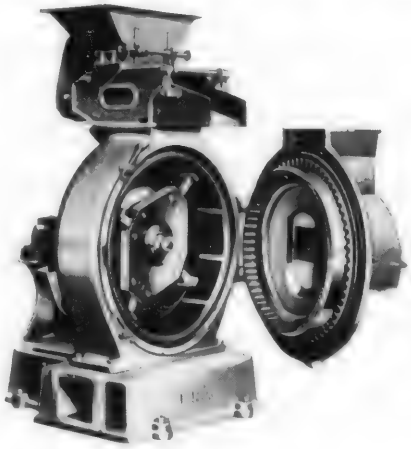

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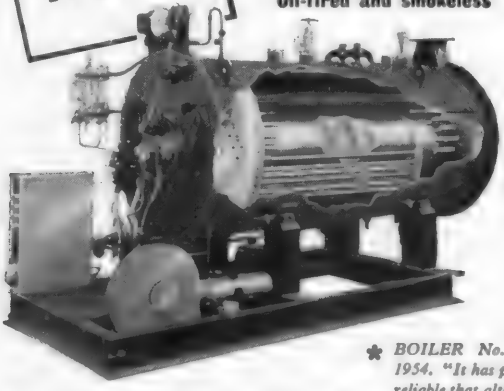

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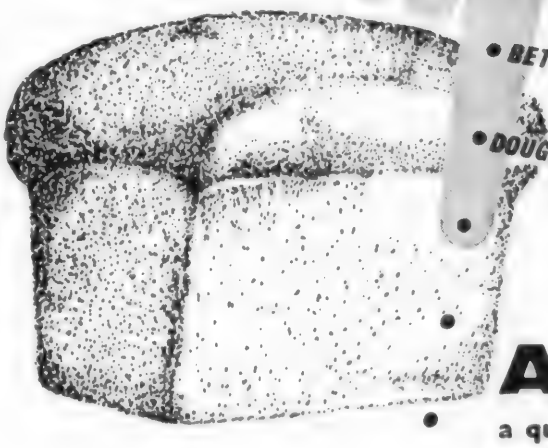

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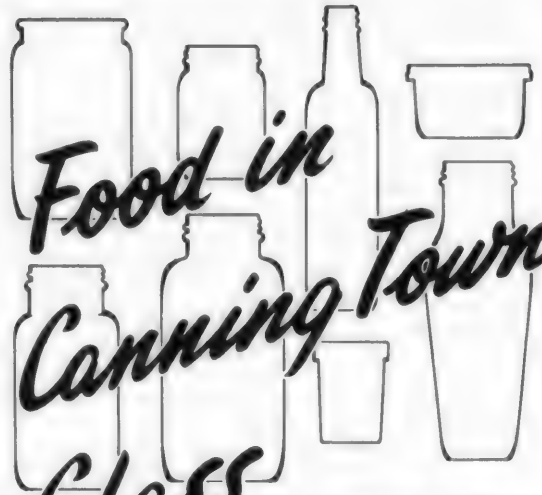

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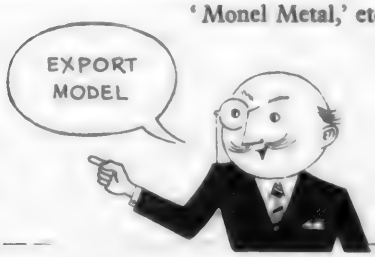

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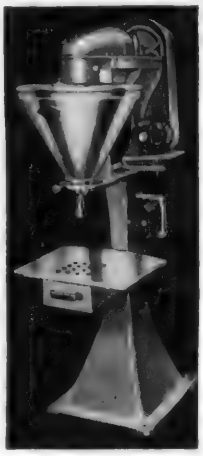

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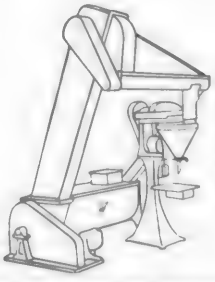

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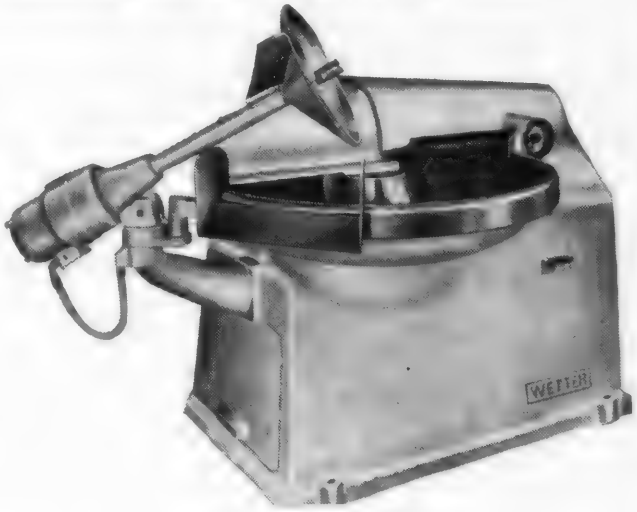

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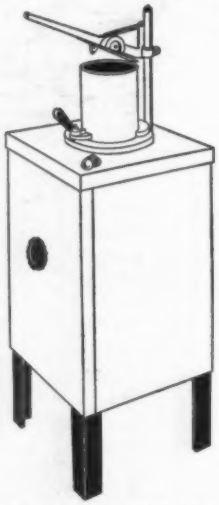

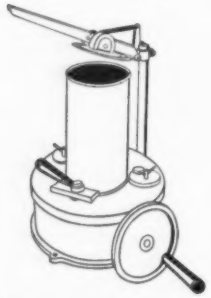

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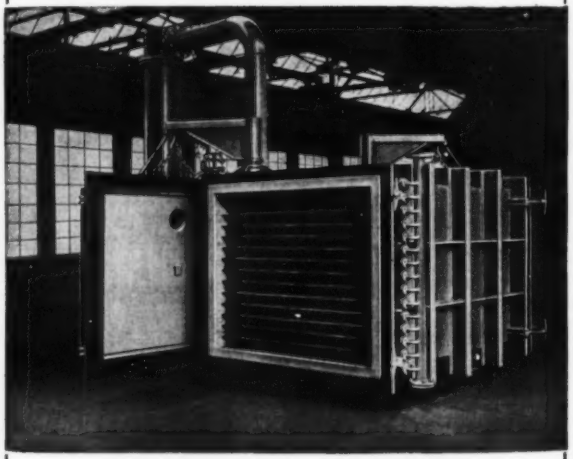

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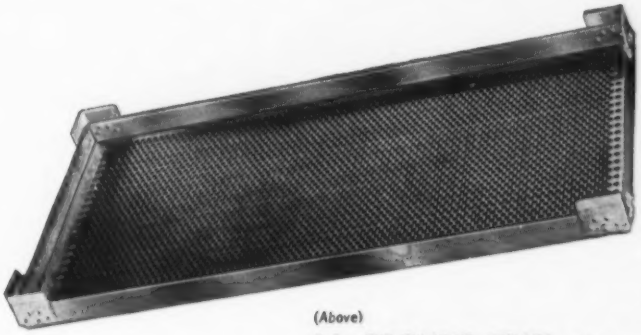

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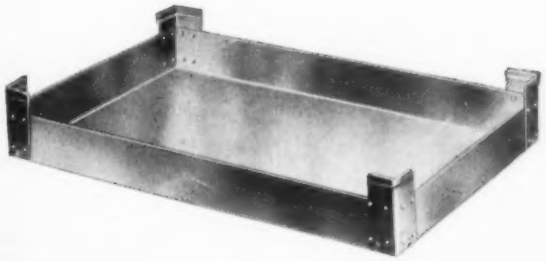

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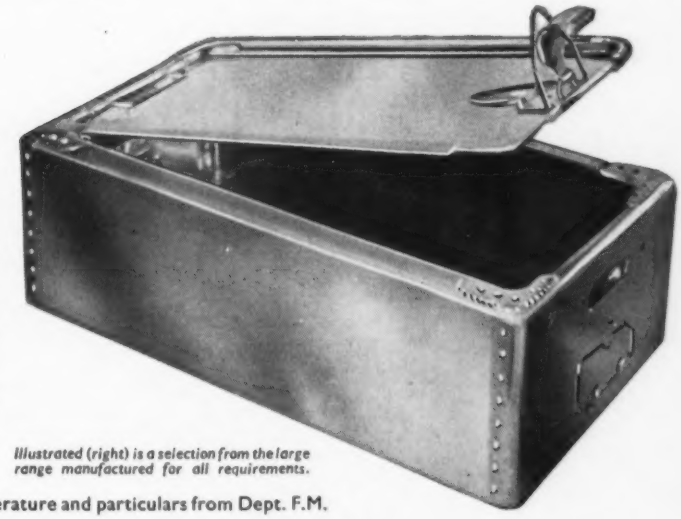

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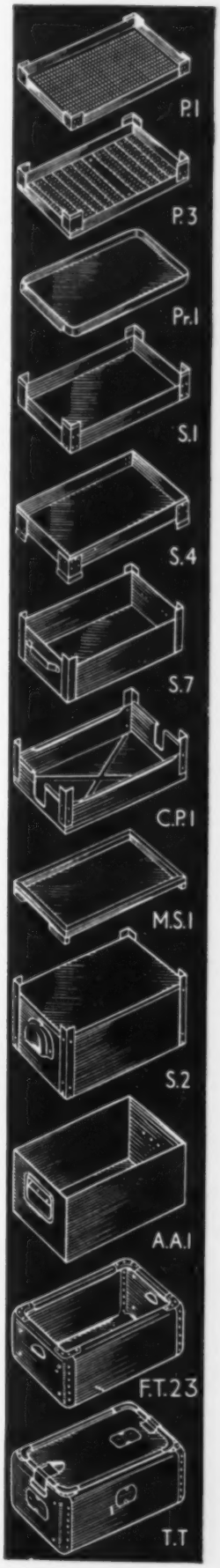

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